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Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

Second Draft Report on

REMEDIAL INVESTIGATION
BLUFF ROAD SITE
RICHLAND COUNTY, SOUTH CAROLINA
VOLUME I OF II

Prepared For:

South Carolina Department of Environmental
and Health Control
2600 Bull Street
J. Marion Sims Building
Columbia, South Carolina 29201

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Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

April 28, 1986

853-3079
FN 307

South Carolina Department of Health
and Environmental Control
2600 Bull Street
J. Marion Sims Building
Columbia, South Carolina 29201

Attn: Mr. James R. Ullery, P.E., Director

RE: SECOND DRAFT REPORT
REMEDIAL INVESTIGATION
BLUFF ROAD SITE
RICHLAND COUNTY, SOUTH CAROLINA

Gentlemen:

Enclosed is our Second Draft Report on the Remedial Investigation for the Bluff Road Site in Richland County. This comprehensive report presents the results of the investigation, our conclusions regarding the type and extent of contamination present at the site, and incorporates the SCDHEC and EPA comments presented at the February 18, 1986 meeting. All information contained in previous reports submitted on this project has been included in this report.

Golder Associates is pleased to have assisted SCDHEC with the Remedial Investigation on this project. It has been a pleasure to work with your personnel. If you have any questions or need further information, please call us.

Very truly yours,

GOLDER ASSOCIATES

M T Feeney

Michael T. Feeney, P.E.
Senior Engineer

MTF:mrs

Enclosure

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1.0 INTRODUCTION

The Bluff Road Site in Richland County, South Carolina, is about 10 miles southeast of Columbia (Figure 1). The site was operated by South Carolina Recycling and Disposal, Inc. (SCR&D), as a storage, recycling, and disposal facility for waste chemicals from 1976 to 1982. In 1975, chemicals were stored at the site. An acetylene manufacturing facility was operated on the property prior to its use as a waste facility. A site visit in March, 1980, by the United States Environmental Protection Agency (EPA) revealed leaking containers of volatile organic compounds. Chemicals were reportedly observed leaking from the drums and into drainage ditches and the on-site surface lagoon (originally used during the acetylene manufacturing operation to hold waste lime). Analysis by the EPA of drainage ditch sediments indicated the presence of organic compounds, halogenated organics, pesticides and metals (Reference 1).

A groundwater investigation was performed by the South Carolina Department of Health and Environmental Control (SCDHEC) in the fall of 1980. Groundwater samples revealed elevated levels of chlorinated organic solvents and lead. Resampling in August 1982 indicated that concentrations of organic compounds in the groundwater were increasing (Reference 2).

Preliminary clean-up of the site was performed in 1982 and 1983, partly under the Comprehensive Environmental Response Compensation Liability Act (CERCLA). Drums of chemicals and contaminated soil were removed and many areas were covered with gravel to provide clean roads. The on-site lagoon, material adjacent to the lagoon identified as lime, and a large above ground tank remained on site. Some reports indicate that an underground tank also remains on

site, however, this is not certain. An area in the rear of the site was cleared and used for detonation of shock sensitive materials during the site cleanup. This area is referred to as the demolition area.

Golder Associates was retained by SCDHEC to conduct a Remedial Investigation at the site to determine the type, extent, and degree of soil and groundwater contamination on and around the site. The investigation has included a surface geophysical survey, a soil gas survey, soil sampling and groundwater monitoring. The groundwater monitoring and analysis program was completed in two phases. Preceeding each phase Golder Associates submitted an interim report. The first, titled "Proposed Initial Monitoring Well Program, Bluff Road Site, Richland County," was submitted in January 1985. The second interim report, submitted in July 1985, was titled "Proposed Second Phase Monitoring Well Locations".

This report is the comprehensive report for the Remedial Investigation at the Bluff Road site. The results of all investigations, sampling, and analyses for this project are reported, including the information presented in previous interim reports. This report describes the extent, degree, and type of contamination present in the on-site soils, the on-site lagoon, and in the groundwaters both on and off the Bluff Road site. The hydrogeology of the area, groundwater flow, and contaminant movement are also discussed.

2.0 INVESTIGATIVE APPROACH

In conducting this Remedial Investigation Golder Associates employed a phased approach and proceeded in a stepwise fashion from one phase of the project to the next. At each phase of the investigation data was collected, analyzed, interpreted, and used to make a preliminary assessment of the extent of contamination within and around the site. This preliminary assessment was used to guide the next phase of the investigation. As additional data was collected the understanding of the physical characteristics of the site was improved and the preliminary contamination assessment was refined. In most instances, each phase of the investigation indicated that the areal extent of contamination was larger than had been anticipated after the preliminary assessment of data from the previous phase. Nonetheless, preliminary assessments were valuable in guiding the course of the investigation and arriving at a complete assessment of the physical characteristics and the extent of contamination present at the Bluff Road site. This section of the report presents a summary of the various phases of the Remedial Investigation and the technical methods used during each phase to investigate the site and surrounding area.

Golder Associates began the Remedial Investigation for this project in November 1984. The first phase of the project involved a review of reports from previous investigations and a literature search to determine general stratigraphy and groundwater conditions present in the region surrounding the site. This review allowed the development of a broad understanding of conditions affecting the site and guided the development of appropriate investigative methods for use in later phases of the investigation. The second phase of the investigation involved the col-

lection of soil, lagoon, and sludge samples from within the former SCR&D facility in order to evaluate the potential sources of contamination. Soil, lagoon water, and lagoon sludge samples were collected in January 1985, with chemical analyses being completed soon thereafter. A sludge sample from the above ground tank and additional lagoon water samples were collected in September and November, 1985 respectively.

Initial consideration of land outside the boundaries of the former SCR&D facility was made during the third phase of the investigation which was a geophysical survey. This survey, conducted in December 1984, involved using a portable electromagnetic device to induce an electric current below the ground surface and measure the bulk conductivity of the soil mass. This data was reviewed in the field and the areas of geophysical investigation adjusted accordingly. At the time of the investigation there seemed to be little to no correlation between bulk conductivity and the existence of volatile organic contamination. Therefore, the fourth phase of the investigation, the initial well program, relied primarily upon the results of the previous SCDHEC investigation (Reference 2) and the study of regional hydrogeology to determine the proposed well locations and depths. The initial wells installed by Golder Associates were completed in March and April, 1985. Groundwater samples taken from the wells were analyzed for each priority pollutant volatile organic compound and representative selected samples were analyzed for all priority pollutants. The initial well program allowed determination of site stratigraphy, the general direction of groundwater flow, the approximate depth to which contamination extended, and the class of chemical compounds present in the groundwater.

In order to rapidly survey a large area in the general direction of groundwater flow for volatile organic contamination, a soil gas survey was conducted as the next phase of the investigation. The survey was carried out by making a series of shallow borings into the unsaturated soil above the uppermost aquifer, then withdrawing and analyzing a sample of gas from the unsaturated soil mass. The analysis of the gas indicated the presence, or lack, of volatile organic compounds in the soil gas surrounding the borehole. The soil gas survey indicated an area of contamination downgradient of the SCR&D site and these results were used to determine the initial locations of wells to be installed during the next phase of the investigation, the second well program.

The second well program consisted of installing additional wells to define the extent of the contaminated groundwater, establish the concentration of chemicals in the groundwater, and obtain hydrogeologic data to complete the definition of site stratigraphy and hydrogeology. The second well program was completed in two stages. The first stage was carried out in August and September, 1985. Chemical analysis of groundwater samples taken after this first stage indicated such a large contaminated area that additional consultation with SCDHEC was needed to continue the work. Also, permission to access additional property was needed before the second, and final, stage of the program could be implemented. This access was obtained in November 1985, the second stage was begun immediately, and was completed in December 1985.

Also in December 1985, a pumping test was conducted at the site to determine, among other parameters, the hydraulic conductivity of the uppermost aquifer with a greater degree

of confidence than could be obtained from grain size analyses of soil samples. In January 1986, treatability studies were conducted on contaminated soil and groundwater samples collected from the site. The purpose of these studies was to determine the potential effectiveness of leaching and aeration in removing contaminants from soil and groundwater.

The following sections of this report describe in detail each of the phases of the investigation at the Bluff Road Site. A complete description of the methods, results, and in some cases, interpretations made during the phase is given. Each of these phases was used to better understand the site conditions and the extent of contamination, and to focus the investigations of the following phases.

This report concludes with several sections which employ all the data collected to make a complete assessment of site and presents recommendations concerning continued monitoring and data collection at the site.

3.0 REGIONAL STRATIGRAPHY AND HYDROGEOLOGY

The Bluff Road Site is located in the Upper Coastal Plain physiographic province. In this area sedimentary deposits of Cretaceous and Tertiary Age overlie older crystalline rocks. Because the site is located near the Fall Line (the landward boundary of the Upper Coastal Plain) the sediments are thinner than those closer to the coast. Also, many formations present near the coast are not found among the sediments near the site. The major stratigraphic units present in the region are the Okefenokee, Black Mingo, and Middendorf Formations.

The surficial soils in the vicinity of the site consist of terrace deposits of the Okefenokee Formation. They are water deposited, irregularly interbedded deposits of sand, gravel, and clayey sands. The surficial sands are underlain by the Black Mingo Formation. Regionally the formation consists of an upper portion of dense, massive gray clay and a lower portion of coarse-grained, cross-bedded sands. The predominant clay mineral in the upper portion is montmorillonite with quartz, opal, calcite, and mica minerals also being present. The lower portion of the Black Mingo Formation consists of coarse-grained sands sometimes containing glauconite. These sands are very similar to those in the underlying sediments.

The Middendorf Formation is the deepest of the sediments in the region and directly overlies the crystalline rocks. Near the Fall Line the formation was deposited in a fluvial environment and consists of irregularly inter bedded sand and gravel, light colored feldspathic and kaolinitic sands, and lenses of kaolin. Some upper beds exhibit a distinctive purple and white mottling.

The hydrogeology of the sediments in the region is relatively simple. The surficial sand is the uppermost aquifer of the region. Recharge is by infiltration of rainfall from the ground surface. Water in this aquifer is typically slightly acidic with low total dissolved solids. However, natural iron concentration may exceed drinking water standards in some locales. Yields from this surficial aquifer are generally sufficient for domestic use (Reference 2). The clay underlying the surficial sands is an aquitard restricting the downward flow of groundwater from the surficial aquifer and serving as a confining layer for underlying aquifers. The sands of the lower Black Mingo and Middendorf Formations are very similar and are hydraulically connected. These strata constitute a confined aquifer. This is an important aquifer in the region with yields generally sufficient for irrigation or industrial use. Water quality is suitable for most purposes. The aquifer is primarily recharged in the Formation's outcrop area near the Fall Line.

4.0 PREVIOUS INVESTIGATIONS

The first investigation conducted on the SCR&D site was performed by the Surveillance and Analysis Division of the U.S. Environmental Protection Agency (EPA). Results are described in their report entitled "Groundwater and Surface Water Investigation, South Carolina Recycling and Disposal, Inc., Bluff Road Site, Columbia, South Carolina" July 1, 1980. During their site visit (March, 1980), the investigators noted "numerous examples of spillage and/or leaking drums in the drum storage area", "chemical spillages exist in direct contact with water pooled in the old filled lagoon", and "badly contaminated surface water drains directly to a swampy area adjoining the site." Fourteen water and soil samples were obtained. These included soil samples from the SCR&D site, water and sediment samples from drainages features near the site, water samples from local water wells, and water and sediment samples from Myer's Creek.

A variety of metals were present in soil and water samples collected on and around the SCR&D site. Possible sources of the metals include deteriorated drums, natural soil metals, and waste lime, as well as spilled hazardous wastes. Surface water and sediment samples from the lagoon area showed elevated levels of calcium when compared to the other samples. Water from the SCR&D well exceeded secondary water quality standards for iron and manganese and approached primary drinking water standards for lead. EPA concluded that the sediment and water samples from Myers Creek were within normal ranges.

Organic compounds found in surface water and soil samples from the SCR&D site included phthalates, pesticides, other aromatic compounds including chlorinated benzene and

phenols, and other compounds tentatively identified as organics by EPA. Volatile organic compounds were not found in the surface soils, although drums of volatile compounds were observed to be leaking. Volatile organics were found in surface water samples. Traces of phthalates were found in both surface water and groundwater. A trace of dieldrin was found in the Campbell's Garage Well which EPA proposed may have been due to termite or ant control practices.

Groundwater conditions at the site were investigated by SCDHEC and described in their report entitled "Investigation of Groundwater at South Carolina Recycling and Disposal Company, Bluff Road Site, Richland County, South Carolina" (January, 1981). Investigators installed eleven shallow monitoring wells around the SCR&D site and Campbell's Garage with screened intervals varying between 9 feet and 22 feet in depth. Water level measurements indicated a shallow, relatively flat water table, with flow to the east and northeast.

Initial groundwater quality sampling was performed by SCDHEC in September, 1980. Specific conductance of the water samples varied from 20 to 1500 micromhos/cm (umhos/cm) with a pH between 5.0 and 6.0. Lead was found in many wells in excess of drinking water standards (0.05 ppm). Volatile organic compounds were found in many wells. Some of these compounds may be attributable to the use of PVC solvent cement in well construction. However, both the number of volatile organic compounds and the concentrations were greatest in wells downgradient of the SCR&D site and Campbell's Garage. These results led SCDHEC to conclude that groundwater contamination existed at the site and was moving at a relatively slow rate to the northeast and southeast.

Groundwater sampling was again performed by SCDHEC in August, 1982, and the results published as an addendum to their 1981 report. Resampling showed an increase in both the number and concentration of volatile organic compounds, leading SCDHEC to conclude that the groundwater quality surrounding the site continued to be degraded.

5.0 ON-SITE SOIL, LAGOON, AND TANK INVESTIGATIONS

5.1 Overview of On-Site Investigations

An investigation of the soil, lagoon, and aboveground tank within the boundaries of the former SCR&D facility was made in order to characterize potential sources of groundwater contamination and to determine the degree of contamination remaining on-site. The majority of this phase of the Remedial Investigation was completed in January 1985, although selected samples were obtained in September and November, 1985. Each area of the on-site investigation is presented in detail in the following subsections.

5.2 Soils

The near-surface soils on-site were investigated by a series of 18 shallow borings drilled on January 22 and 23, 1985 at locations shown on Figure 2. The purpose of these borings was to determine the variability of soil contamination with depth and plan location on the site. Borings were located on approximately 50 foot centers across the site and boring depths ranged from 4.5 feet to 15.5 feet. Borings were not extended below the water table. A drilling rig could not access the location of boring ST18 due to very soft soil conditions which were later determined to be a closed, lime filled lagoon.

A total of 65 split spoon samples were obtained from the borings at various depths to provide representative samples of the various soil strata. Each sample was immediately placed in a glass sample jar and the lid tightly sealed. A visual description of each sample was made in the field and used to develop a log showing the strata in each boring. These boring logs are included in Appendix A-1.

Field indications of chemical contamination in the soil were obtained using an organic vapor analyzer (OVA) operated by Mr. Chris Staton of SCDHEC. Readings of the concentration of organic vapors were obtained by analyzing the vapors inside the glass sample jar. Readings of samples taken on January 22 were made a few minutes after sampling. On January 23, all readings were taken at the end of the day because of an earlier OVA breakdown. OVA readings varied from 1 to 90 parts per million (ppm) with most readings between 10 and 50 ppm. Some organic vapors were detected in almost every sample. Individual sample readings are noted on the boring logs in Appendix A-1. The conditions under which sample readings were taken was rather variable. The air temperature was approximately 35°F and the wind was blowing. As described above, the waiting time between sampling and the OVA reading also varied. Because of these conditions, the OVA readings are considered useful only as an indicator of the presence of contamination and not a measure of a specific concentration of contamination.

Cross-contamination between samples and borings was prevented by steam cleaning the split spoon sampler between samples and steam cleaning the sampler, hollow stem augers, and working areas of the rig between borings.

The OVA readings obtained in the field indicated that the on-site near surface soils are contaminated virtually throughout the site from the ground surface down to the water table. In order to determine the approximate concentration of compounds present in the soil, representative samples were selected for laboratory chemical analyses.

In selecting samples for analysis, the OVA readings were used to identify a group of five soil samples which were considered to represent on-site conditions. Equal weight portions from each sample were combined to form a single composite sample. The composite sample was analyzed for priority pollutants. The analysis showed that volatile organics and metals were present in the soils. Priority pollutant pesticides, PCB's, base neutral, and acid extractable compounds were not present above the method detection limit for soils. Analysis results are presented in Appendix C. This analysis indicates that volatile organics and metals are the only classes of compounds present in high concentrations or located throughout the site. The other classes of compounds, if present at all, seem to be confined to one or more small areas.

After completing the analysis of the composite sample, 18 soil samples (including the five used to form the composite) from various depths and locations on the site were selected for volatile organic analysis. The observed concentrations varied from the method detection limit to 23,465 parts per billion (ppb). Values greater than 1000 ppb were observed only within 5.5 feet of the ground surface at test locations ST10, ST12, ST17 and ST19. Values less than 1000 ppb, and usually below 100 ppb, were noted at all test locations. Complete analysis results are presented in Appendix C.

were the sample mentioned above? Analyzed w/in holding times

In evaluating these analytical results, it should be noted that there are a number of difficulties associated with sample and analyzing soils for volatile organics. Volatile compounds volatilize from the time of sampling until the sample jar is sealed. Even after sealing, compounds continue to volatilize and become diluted in the air

inside the sample jar. Selecting representative portions of soil from the jar for analysis is difficult since standard soil handling procedures such as drying, splitting, and mixing cannot be used. Because of these difficulties the absolute level of the compounds indicated by the analysis may not correspond to the concentrations present in-situ. However, since all samples are subject to the same handling effects the relative levels of the compounds should be accurate. Because of the difficulties in conducting the analyses the chemical lab, Applied Biology Inc., elected to do a second analysis of the 18 soil samples. The second analysis generally indicated lower concentrations of volatile organics. Applied Biology Inc. indicates that they consider the relative concentrations determined during the second analysis to be more accurate than in the first analysis since some of the laboratory handling procedures were modified. Results of the second analysis are also included in Appendix C.

5.3 Lagoon

Golder Associates sampled the water and bottom sediments from the on-site lagoon in January 1985. Sampling locations are shown on Figure 2. To assist in determining sample locations, the lagoon was surveyed using using a nearby base line. Offsets from this base line were determined by taping and turning right angles with a hand held optical prism. During the survey, parallel lines of flagged stakes were established around the lagoon in order to locate lagoon sampling locations.

Lagoon sampling was carried out by two Golder personnel in a 12 foot aluminum boat propelled by poling. Water samples were obtained by filling sample jars directly from the lagoon, and sediment samples were obtained by driving a 1"

ID thin-walled piston sampler into the sludge. The depth of lagoon water at the time of sampling and the thickness of the sediments were estimated by marking depths at 6 inch increments on the piston sampler and rods. Six samples each of lagoon sediment and water were obtained during the sampling program. Lagoon sampling locations are shown on Figure 2.

At the time of sampling, maximum water depth in the lagoon was 3.5 feet. The top of the sediment consisted of a very soft layer of organic material one or two inches thick. This was underlain by a layer of hardened lime estimated to be about 3 inches to 6 inches thick. Below this, a layer of soft lime was encountered approximately 1.0 feet to 1.5 feet in thickness. This thickness was estimated by determining the depth to probe refusal of probes which penetrated the soft lime. In some areas, probe refusal was reached in the hard lime 3 inches to 6 inches below the top of the sediment.

Priority pollutant analyses were performed on composites of the six water and six sediment samples. The composite water sample had a pH of 7.7 and a specific conductance of 492 umhos/cm. No priority pollutant organic compounds, including pesticides, PCB's, acid, base neutral, extractable, or volatile compounds were present in the composite water sample above the Method Detection Limit (MDL). Copper (0.152 ppm) and magnesium (0.12 ppm) were the only priority pollutant metals present in concentrations exceeding 0.1 ppm. The magnesium is probably associated with the lime remaining from the acetylene manufacturing operation. The analysis results are reported in Appendix D.

The composite sediment sample had a pH of 11.5 and a moisture content of 56 percent by weight. It did not contain pesticides, PCB's, or acid extractable compounds above the MDL, but did contain ethylbenzene (23 ppb) and naphthalene (18 ppb). The predominant metal present was magnesium (170 ppm). This level is not surprising considering the high amount of lime present in the sediment. Arsenic (19.8 ppm), nickel (17 ppm), and zinc (9.4 ppm) were the only priority pollutants present in the sediment at concentrations greater than 5 ppm. Complete analytical results are included in Appendix D.

These composite analyses indicated that the lagoon water was virtually uncontaminated and the lagoon sediment was only slightly contaminated. Because of the results of the composite analysis, and because there was no reason to expect wide variation in the composition of the individual water and sediment samples, it was decided, after consultation with the SCDHEC, that analyses of the individual water samples were unnecessary and that individual sediment samples would be tested only for selected metals. The metals chosen were copper, arsenic, and chromium. Concentrations in the individual sediment samples varied from 0.50 ppm to 10.6 ppm. Complete results are included in Appendix D.

couldn't composite samples have caused dilution

5.4 Above-ground Tank

A tank remaining from the surficial cleanup lies on the ground surface just inside the fence line near Bluff Road. The cylindrical steel tank is approximately 5 feet in diameter and about 20 feet long. The outer surface of the tank is rusty, but no holes, bulges, or other signs of serious deterioration are evident. The only openings evident are several round holes at the top of the tank.

Golder Associates sampled the material in the tank in September 1985. The tank contained no ponded fluid but contained about 0.5 feet of sludge. A sludge sample was obtained by inserting a one-inch diameter PVC pipe into the sludge and scraping the sludge which stuck to the pipe into a sample jar. The sludge was black and dark brown with an oily appearance. The sample was analyzed for priority pollutants. Analysis results indicate that the sludge is composed primarily of 2-chlorophenol and Phenol at concentrations of 33,300 ppm and 13,774 ppm respectively. Trichloroethylene, 2,4-Dichlorophenol, and 2,4,6-Trichlorophenol were the only other priority pollutants indicated by the analysis. Complete sample results are included in Appendix E.

Golder Associates submitted the chemical analysis results for review by an industrial hygienist subcontracted to Golder Associates on this project. The hygienist concluded that direct contact with these compounds would pose an immediate danger to life and health and that short-term exposure to vapors of these compounds poses a health risk. Golder Associates requested that the tank be removed from the site but learned that EPA emergency funds were not available for removal.

6.0 SURVEY OF SCDHEC WELLS

In August 1985 Golder Associates made a complete survey of the wells previously installed on this project by SCDHEC (Reference 2). These wells had been installed to determine if groundwater contamination was present and approximately located on the perimeter of the former SCR&D site. Due to the preliminary nature of the investigation and the limited budget available at the time, each well was constructed of 2 inch PVC pipe and screen glued together with PVC cement, and no locking covers were installed. The details of each well surveyed are reported below and their locations are shown on Figure 3.

Well W-1 was found intact with the cap marked "1" in place. This well is located on the east side of Bluff Road approximately 20 feet from the road in some tall weeds. The depth of the well taken from the top of a 2.5 foot stick-up is 24.95 feet. Depth to the water was 12.25 feet from the top of the casing on August 22, 1985.

Wells W-2 and W-3 could not be located and are presumed to be destroyed.

Well W-4 was found with the casing broken at the ground surface and a piece of PVC lying beside the well. The cap on the broken casing was marked "4". The depth to the water was 7.25 feet from ground surface on August 22, 1985. The total depth was not measured. At the request of SCDHEC, Golder Associates sealed this well on December 6, 1985 by filling the inside of the casing to the ground surface with bentonite pellets.

Well W-5 was previously reported destroyed by SCDHEC (Reference 2) and could not be located.

Well W-6 was found intact in a marshy area on August 22, 1985. Four days later it stood in 3 inches of water due to rain. The cap marked "6" had brown stains on it indicating that water may have completely submerged this well in the past. The total depth was 12.35 feet from the top of the 0.7-foot stick-up. Water was 6.95 feet from the top of the casing on August 22, 1985.

Well W-7 was found intact, with the cap in place, standing in 3 inches of water. The cap was marked "W-7". The stick-up was 0.6 feet and the depth was 12.45 feet from the top of the casing. Depth to water on August 22, 1985 was 6.95 feet from the top of the casing.

Well W-8 was found intact standing in a wet soil area under a fairly thick tree cover. The cap was marked "8". The total depth measured from the top of a 0.5-foot stick-up was 12.55 feet. The depth to the water was 7.25 feet from the top of the casing on August 22, 1985.

Well W-9 was found completely intact in a wooded area with heavy undergrowth. The information on well depth and depth to water is unknown.

Well W-10 is located in a marshy area but there was no standing surface water in this area on August 22, 1985 when the water level in the well was measured. Four days later there was 3 inches standing water in the area from rainfall. A brown stain on the casing six inches above the ground surface indicates water in this area has been at least as deep as 6 inches. The well was intact with a cap marked

"10". The total depth measured from the top of the 1.0 foot stick-up was 15.85 feet. The water level measured on August 22, 1985 was 6.25 feet from the top of casing.

Well W-11 was found in a wet area under a fairly thick tree cover. Due to the 0.3-foot stick-up and color of the protruding casing it seems likely that this well at times is completely submerged. The total well depth was 11.95 feet from the top of the casing. The depth to water on August 22, 1985 was 6.25 feet from the top of the casing.

7.0 GEOPHYSICAL SURVEY

7.1 Overview

Golder Associates' first off-site investigation at the Bluff Road Site was a surface geophysical survey. A geophysical survey is a rapid, relatively inexpensive and non-intrusive means of gaining preliminary contamination information over a large area. It is often useful for locating areas for further testing, but can be interpreted most accurately when correlated with borings or test pits. An eletromagnetic induction conductivity instrument, the Geonics EM-34-3, was selected for use in this investigation because of its applicability to the soil conditions, ease of operations, and cost effectiveness.

A primary limitation of conductivity surveys is the inability to readily detect volatile organic compounds in groundwater because these compounds do not usually increase the conductivity of groundwater. Nonetheless, considering the specific conductivities of up to 1500 umhos/cm measured by SCDHEC in 1980 (Reference 2), it was decided by SCDHEC and Golder Associates to perform the geophysical survey.

7.2 Methods

The Geonics EM 34-3 instrument used for the survey works by electromagnetic induction. An alternating current is produced in the transmitter coil, which induces a magnetic field in the surrounding soil. This sets up a secondary electric current in the soil, which is sensed by the receiver coil. The instrument measures conductivity in units of millimhos per meter (mmho/m). Because the current is induced in the ground indirectly, there is no need for the probes, lead wires, etc., associated with conventional electrical surveys.

The survey was primarily carried out with the coils held vertical and a coil separation of 33 feet (ten meters). In this configuration about 85% of the reading will be contributed by soils less than 33 feet deep. In a stratified soil, the bulk conductivity reading will be biased toward the more conductive layer.

Some readings were taken with coils held vertical and a coil separation of 66 feet (20 meters). This configuration affects a larger volume of soil, horizontally and vertically, than does the 33 foot spacing, and is less influenced by small scale variations in conductivity. These readings were used primarily to confirm or discount apparently spurious readings.

The Bluff Road Site and the immediately adjacent areas were surveyed using a 33 foot coil separation taking readings on approximate 50 foot centers. Areas further from the site were surveyed on approximately 100 foot centers. Selected points on and near the site were re-measured using a 66 foot coil separation. Areas of high local conductivity variation as determined using the 33 foot coil separation tended to have a conductivity closer to the average when measured by the 66 foot coil separation; otherwise, no systematic variation in conductivity with coil separation was noted. Some high readings were noted in the vicinity of old fences along the former facility boundaries and power lines alongside Bluff Road. In all, over 120 conductivity readings were taken. All locations were flagged at the time of the survey and were located in relation to existing wells and landmarks by compass and pace methods. Selected traverse end points were later located by a registered land surveyor.

7.3 Results

The geophysical data and a contour plot of bulk conductivity is presented as Figure 4. A pronounced conductivity high in the 40 to 90 mmho/m range was located adjacent to the existing lagoon; this area appears to be a closed lagoon. Relatively high conductivity, on the order of 20 mmho/m, was found over the north-northeast corner of the site. Somewhat elevated conductivities, 10 mmho/m or more, were found over most of the rest of the site, the right of way between the site and Bluff Road, an area behind the former Campbell's Garage near a channel carrying surface run-off from the site, and along a line extending from the high area adjacent the lagoon in a north-northeast direction toward the demolition area.

Other areas adjacent to the site exhibited bulk conductivities of 4 to 7 mmho/m. This appears to be background for the area. About 400 feet northeast of the site, conductivities of 10 mmhos or more were noted, increasing to 20 mmhos/m about 800 feet from the site. Explanations for the observed conductivities is presented in Section 7.4.

7.4 Interpretation

Bulk soil conductivity as determined by the geophysical survey may be approximately compared to groundwater conductivities listed in SCDHEC's report (Reference 2) by application of Archie's Law (Reference 3), as shown below:

$$C_B = C_F n^m$$

where: C_B = the bulk conductivity of the soil mass,
C_F = the conductivity of the pore water,
n = total porosity of the soil, and
m = a constant ranging from 1.3 to 2.

A porosity (n) of 35% and an m value of 1.4 was assumed. It was also assumed that the soil and water were homogeneous with depth, and that the contribution to bulk conductivity of soil above the water table was minor. SCDHEC's report lists background water conductivities at the site perimeter of about 50 to 100 micromhos per centimeter(5 to 10 mmho/m) and elevated conductivities of about 500 to 1,500 micromhos per centimeter (50 to 150 mmho/m) for contaminated water. Using the n and m values assumed above, soils saturated with these waters would have a calculated bulk conductivity of 1 to 3 mmho/m for the background water and 11 to 35 mmho/m for the contaminated water. The background readings of bulk conductivity in the 4 to 7 mmho/m range near the site are slightly higher than the calculated values. This is possibly due to the clay content of the soil. Elevated bulk conductivity readings of 10 to 40 mmho/m encountered on site and in some adjacent areas correlate well with the values calculated from SCDHEC's water data. The very high (75 to 90 mmho/m) readings found adjacent to the existing lagoon are apparently due to a closed lagoon filled with lime or a similar material. Such a material would be expected to have a high water content and pore water conductivity would be high due to ions dissolved from the lime in the lagoons. The area of high conductivity beginning about 400 feet from the site, and extending northeast, did not correlate with later data indicating the extent of contaminated groundwater. This high conductivity area is most likely related to the increasing clay content of the soils in this area.

In summary, the results of the geophysical survey correlated well with information about the site available at the time of the survey. However, the survey results did not indicate a pattern of high, or low, conductivity readings

which correlated with the direction of groundwater flow. Therefore, Golder Associates concluded that the geophysical survey did not identify any areas which were likely to be contaminated with organic solvents.

8.0 INITIAL WELL PROGRAM

8.1 Overview

The initial groundwater monitoring program consisted of the installation of eight monitoring wells. Five of these wells were installed in the surficial aquifer at depths less than 50 feet. Three of the wells were installed below the surficial aquifer at depths ranging from 95 to 115 feet. Cross-hole contamination and introduction of contaminants into the well or groundwater was avoided through careful cleaning procedures, as listed below:

1. All drilling equipment was degreased and cleaned prior to drilling to minimize the potential for contamination introduced to the well from an outside source. All drilling tools were steam cleaned on-site prior to drilling each borehole to minimize potential cross-contamination from the wells.

2. The split spoon samplers were cleaned with water between samples to reduce the potential for cross-contamination. The water was from the county water supply system.

3. All PVC well pipe and screen materials were steam cleaned prior to use. Latex gloves were worn by personnel during installation. Filter fabric used around the well screen was steam cleaned prior to use. The sand filter material was a commercially produced silica sand.

4. On many occasions it was necessary to wash the sand out of the hollow stem auger with water prior to obtaining the sample. This water was obtained from the county water supply system.

5. A locking protective steel cover was cemented over each completed well to protect the well head. The cover was painted with a rust preventive paint and locked.

8.2 Surface Aquifer Wells

Five wells, BP-1 through BP-5, were installed in the surficial aquifer. Each of these wells contains multiple piezometric tips evenly spaced along the length of the well. The multiple tips were used to determine the vertical variation in piezometric head and for sampling the groundwater at various depths within the surficial aquifer.

Wells BP-1 and BP-2 were constructed using several tubes of flexible 3/8-inch inside diameter polyethylene secured to the outside of 1 inch inside diameter Schedule 40 flush threaded PVC pipe. The lower end of each polyethylene tube was connected to approximately 7 inches of vyon, a porous polyethylene tubing which served as the piezometric tip. The bottom 2.5 feet of the PVC pipe was slotted to serve as the deepest piezometric tip. This "bundle" of piezometers was inserted into the hollow stem of the drill augers after completion of drilling and sampling. The augers were then withdrawn from the hole and the soil allowed to collapse against the piezometers. Wells BP-1 and BP-2 consist of 10 and 9 piezometric tips, respectively. A monitoring well installation log showing the elevation of each tip and other well construction details is included in Appendix B of this report. Well locations are shown on Figure 3.

Wells BP-3, BP-4, and BP-5 consist of four piezometric tips each. Each well was constructed of three 1-inch diameter PVC pipes and one 2-inch diameter PVC pipe. The piezometer tips are slotted PVC screen sections attached to the bottom of the PVC pipes. All PVC pipe and screen was flush threaded and all joints were teflon taped. Wells were constructed by inserting the three 1-inch PVC pipes into the hollow stem augers and then withdrawing the auger allowing

the hole to collapse around the pipes. The 2-inch pipe was then lowered to the desired depth into the annular space after withdrawing the augers, sand placed to a level above the screen, a bentonite seal placed above this and, the remainder of the hole grouted. Piezometer tips were placed at depths of approximately 12 feet, 20 feet, 34 feet, and 44 feet. Well construction details are summarized in Table 1. Exact screened intervals and other well construction details are shown on the monitoring well installation logs in Appendix B. Well locations are shown in Figure 3.

8.3 Deep Wells

Three deep wells, DW-1, DW-2, and DW-3, were installed with screens located in the Black Mingo Formation underlying the surficial aquifer. Each well was installed in a telescoped fashion to insure that contaminants present in the surficial aquifer would not migrate along the well bore into the Black Mingo Formation.

The deep well drilling began with a 9 inch borehole and was mud-rotary drilled through the surficial sands to about five feet into the underlying Black Mingo clay. Then a 6 inch diameter, flush threaded, PVC casing was installed in the hole. Cement grout was then tremied into the annular space between the PVC casing and the sides of the borehole.

After the cement grout had set, and the drilling equipment had been steam cleaned, drill tools were inserted inside the 6-inch PVC casing and a 5-inch diameter hole was mud rotary drilled using bentonite mud from the top of the Black Mingo formation to the bottom of the boring. A 2-inch diameter PVC screen and casing was then inserted into the hole and the sand pack placed around the screen. The hole was then developed by jetting potable water down the PVC

pipe and out through the well screen. This jetting action flushed the drilling mud cake off the sides of the borehole and removed the drilling mud from the hole. After jetting, the bentonite seal was placed above the sand pack and allowed to hydrate. The remainder of the hole was grouted with cement grout. A locking steel cover was installed to protect and secure the well head. Exact screened intervals and other well construction details are shown in the monitoring well installation logs in Appendix B. Well locations are shown on Figure 3.

8.4 Initial Well Sampling

Water samples were obtained from Wells BP-1 through BP-5 and DW-1 through DW-3 soon after their completion in the Spring of 1985. A sample was also obtained from Myers Creek, which is the first surface water drainage feature downgradient of the site. Further details of the sampling methods and analytical results are discussed below.

8.4.1 Sampling Methods

Wells BP-1 and BP-2 were sampled using a positive displacement method. For this method, a 1/4 inch tube was inserted inside the 3/8 inch polyethlene tube leading to the vyon piezometer tip. Then compressed nitrogen gas was used to pressurize the inside of the polyethlene tube. This pressure forced the water up into the 1/4 inch tubing and into the sample container. Note that this method did not aerate the sample or subject the sample to reduced vapor pressures. A new 1/4 inch tube was used to sample each piezometer tip to prevent the possibility of cross contaminating the samples.

The three deep wells, along with Wells BP-3, BP-4, and BP-5 were sampled using a peristaltic pump located at the ground surface. A new 3/8 inch polyethlyene tube was inserted inside each well casing and the upper end was connected to the peristaltic pump. The sample was suction pumped from the well through the peristaltic pump, into the sample container. Samples collected for metals analyses were filtered with a 0.45 micron filter as they passed through the peristaltic pump.

Samples from Myers Creek were obtained at the location shown on Figure 3 by immersing the sample jar in the creek. Sample containers for all wells and Myers Creek were completely filled. Sample containers were prepared and, when appropriate, preservatives added in advance by Advanced Chemistry Labs of Atlanta, Georgia, the chemical laboratory responsible for analyzing these samples.

8.4.2 Analytical Results

All of the samples obtained in the Spring of 1985 were analyzed for each of the priority pollutant volatile organic compounds. Based on analyses of soil samples and earlier groundwater analyses performed by SCDHEC, it was decided that volatile organic analysis would be used as the indicator analysis for contaminated groundwater. One of the samples was selected for a priority pollutant scan. The results of the chemical analyses showing each compound detected, are presented in Appendix E of this report and are discussed below. Results of volatile organic analyses are summarized in Table 2.

The volatile organic analysis results indicate that in Myers Creek and in Wells DW-1, DW-2 and DW-3, no volatile organic compound was present at concentrations above the

Method Detection Limit (MDL). Volatile organics were not generally present in Well BP-2, but piezometer tips at 22.5 feet and 27.5 feet did show 11 ppb and 12 ppb, respectively, of chloroform. These low levels are not considered to be conclusive evidence of contamination and, at the spring sampling, BP-2 was considered to be uncontaminated.

Volatile organic analyses on samples from Wells BP-1, BP-3, BP-4 and BP-5 identified a variety of compounds. Those present most frequently were:

Benzene	Tetrachloroethylene
Ethylbenzene	Toluene
Carbon Tetrachloride	1,2-Trans-Dicholoroethylene
Chloroform	1,1,1-Trichloroethane
1,1-Dichloroethylene	1,1,2-Trichloroethane
Methylene Chloride	Trichloroethylene
1,1,2,2-Tetrachloroethane	

These compounds were present in concentrations ranging from the Method Detection Limit to 30,635 ppb of 1,1,1-Trichloroethane found in Well BP 4, tip 4. The chemicals listed above were typically identified in con centrations in the hundreds or thousands of parts per billion. Compounds which were occasionally present, in concentrations from about 10 to 100 ppb, were Chlorobenzene, 1,3-Dichloropropene, 1,2-Dichloroethane, and Chlorodibromomethane.

A priority pollutant scan was made on a highly contaminated water sample collected from Well BP 3, tip 3. This analysis identified three phenolic acids and three base neutral benzene compounds present in concentrations ranging from 4 ppb to 281 ppb. Some metals were also present at

concentrations less than 0.1 ppm. The priority pollutant scan confirms that the primary groundwater contaminants are the volatile organic compounds.

Analysis of samples from each of the tips in the five multi-level piezometers showed that volatile organics were present at all depths in the surficial aquifer but were generally at higher concentrations within 30 feet of the ground surface. Profiles showing the variation of contaminant concentration with depth for the frequently occurring contaminants are included as Appendix G of this report. These profiles also suggest, though not conclusively, that the peak contaminant concentrations in Well BP-5 occur at somewhat greater depths than in BP-3 and BP-4. This indicates a possibility that contaminants may be moving deeper into the aquifer as the plume moves downgradient.

9.0 SOIL GAS SURVEY

9.1 Overview

In order to estimate the areal extent of off-site migration of groundwater contaminated by volatile organics prior to drilling additional wells, a soil gas survey was conducted. The survey was performed by drilling holes approximately 7 feet deep, evacuating the soil gases from the hole and analyzing the soil gases for contaminants using an organic vapor analyser (OVA) equipped with a portable gas chromatograph. The details of the survey methods and results are discussed below.

9.2 Analytical Methods

The soil gas survey was carried out with a Foxboro 128 flame ionization organic vapor analyser with a gas chromatograph. The chromatograph column was 12 inches long and packed with 10% 1,2,3(tris) 2-cyanoethoxypropane on chromasorb AW, 60 to 80 mesh. An instrument signal intensity of 3.0 and a sample flow rate of 1.5 to 2.0 liters per minute were used for all tests. Chromatograph results were printed with a strip chart recorder at a rate of 90 seconds/inch.

Because elution time (travel time through the chromatograph column) is a function of ambient temperature, soil gas samples were compared against a calibration gas standard containing about 10 parts per million (ppm) each of analytical grade methylene chloride, trichloroethylene, and perchloroethylene in a matrix of ultra-pure air. The calibration gas was also used to check for drift in the sensitivity of the instrument, of which none was found.

During the initial phase of the investigation gas chromatograph scans were obtained from the head space of jars containing contaminated water samples and from inside the casings of wells known to be contaminated. These scans were compared to the scans made in soil gas borings adjacent to the contaminated wells. The gas chromatograph results were very similar for the soil gas samples, water head space samples, and well casing gas samples. This indicates that contaminated soil gases are a good indicator of contaminated groundwater. These typical chromatograms are presented in Figure 5.

Because the contaminants in the groundwater are a complex mixture of priority pollutants, together with an unknown number of degradation products, no attempt was made to correlate a specific chromatograph peak with a specific contaminant. However, the chromatograms from areas of known contamination yielded a distinctive series of four or more early arriving peaks and the resulting contaminant "signature" was used to identify contaminated soil gas in other areas. Also during the early phase of the investigation, chromatograms of soil gas were taken from areas upgradient of the site to determine the chromatograph signature of naturally occurring organic vapors in the soil. These chromatograms were strikingly different from those in the contaminated areas (Figure 5). Therefore, this investigation approach was very useful in identifying off-site areas of organic contamination around the Bluff Road Site.

9.3 Field Methods

At each soil gas survey location a hand augered boring was made and PVC casing placed in the upper part of the hole. The boring diameter was either 1-1/4 inches or 2 inches, depending on the type of auger used, and the

casing was Schedule 40, 1.5-inch or 2-inch inside diameter PVC pipe. In order to maintain a tight fit the casing was driven as the hole was drilled, keeping the casing only a few inches above the bottom of the hole. The casing was driven to a depth of two feet, after which the boring was continued to a depth of seven feet. Bentonite slurry was placed around the top of the casing to achieve a seal between the casing and the soil, and an air tight fitting was connected to the well casing and to the sampling port of the organic vapor analyser/gas chromatograph.

Prior to each soil gas test a record was made of the test location, the strata encountered in the boring, the date and time of sampling, and the ambient temperature at time of sampling. At the start of the test each boring was purged with the organic vapor analyser set to survey mode until the survey reading stabilized. The survey reading was taken without passing the gas sample through the chromatograph column and it reflects the total concentration of organic vapors in the soil gas. If more than about 5 ppm of organic vapors were detected, the soil gas was injected to the chromatograph column, and the chromatograph signature was determined. Thus, the survey reading gave an indication of the level of organic vapors in the soil gas, and the chromatograph signature established whether the organic vapors were natural or an indication of contaminated groundwater.

Information recorded during each test included time and rate of purging, the soil gas reading taken in the survey mode, whether a chromatograph scan was performed, the nature of the chromatograph signature, and other pertinent information. Calibration gas was sampled about twice a day,

with a survey reading (to check for instrument drift) and a chromatogram (to assess the effect of ambient temperature on elution time) being run.

At some locations, the soil gas was so highly contaminated that it did not contain enough oxygen to support combustion. In this case, the survey reading would gradually rise as the well was purged until the flame in the flame ionization detector was extinguished and the reading fell back to zero. The instrument was then disconnected from the well, relit, and reconnected to the well only long enough to inject a gas sample into the chromatograph column. Purified ambient air was then used to carry the soil gas sample through the chromatograph column, and a chromatograph signature was obtained. The survey reading prior to "flame out" thus represented a minimum soil gas reading and the chromatograph signature indicated the nature of the soil gas.

9.4 Survey Results

Soil gases were surveyed at 24 locations, shown in Figure 6, most of which were located downgradient of the site. Tests at uncontaminated locations indicated natural organic vapors in concentrations between 1 and 7.7 parts per million (ppm). Tests at contaminated locations gave survey readings as high as 300 ppm and could be identified, using the chromatograph column, at concentrations as low as 4.8 ppm. Tests were generally conducted near the site at the beginning of the program, with later tests located progressively further from the site until the edge of the zone of contaminated soil gas was found.

The area of highly contaminated soil gas (survey reading greater than 25 ppm) extends about 600 feet east from the on-site lagoon. The area becomes broader with increasing distance from the lagoon, reaching a maximum width of about 300 feet. The highly contaminated zone is bounded on the north by an area of lesser contamination (5 to 25 ppm) up to 150 feet wide, while on the south and east the zone of lesser contamination is much narrower. The plan extent of these areas is shown in Figure 6. It should be noted that the surficial soils encounterd in the eastern end of the zone of high soil gas concentrations contained significantly higher clay content than soils at other locations surveyed.

10.0 SECOND PHASE WELL PROGRAM

10.1 Objective and General Information

The second phase well program consisted of the installation of 17 monitoring wells (P-6 through P-22) at the locations shown on Figure 3. The objectives of the program were to define the extent and concentration of the plume of contaminated groundwater; to determine the background water quality in the surficial aquifer; and to provide additional details relating to the piezometric surface and flow direction in the surficial aquifer. The second phase well program was completed in two stages due to the large contaminated area. Wells P-6 through P-16 were installed in late August and early September 1985. The remaining wells, P-17 through P-22, were installed in the late November and early December 1985. The wells were drilled, with the exception of P-17, to a depth of approximately 50.0 feet and were screened throughout the entire thickness of the surficial aquifer. Well P-17 was terminated at a depth of 20 feet and screened to the top of the aquifer. In order to minimize the potential for cross-hole contamination and the potential for introducing contamination into the wells or groundwater the drilling equipment and all well materials (pipe, screen, filter fabric) were steam cleaned prior to use. A locking protective steel cover was installed at each well.

10.2 Procedures

The objectives of the second phase well program were met by locating wells near the suspected boundary of the contaminated groundwater plume (to define the extent of contamination) and at various locations on the site where additional hydrogeologic data was required. To assist in determining whether a well was located in a clean (outside

the plume) or dirty (inside the plume) portion of the surficial aquifer an organic vapor analyzer (OVA) was used to scan the auger cuttings for indications of contamination. If while drilling a well intended to be in a clean area the OVA indicated contamination, the boring was backfilled with cuttings, the drill rig was steam cleaned and a second attempt was made to install the well outside the contaminated plume (usually 100 to 200 feet further away from the zone of high contamination). Once wells were installed in the clean areas additional wells were installed in the interior portion of the contaminant plume or at upgradient locations. All wells in the second phase well program used 2 inch diameter PVC screen and riser pipe. Wells were screened across the entire saturated thickness of the surficial aquifer (approximately 40 feet). The well screen had a No. 10 (0.010 inch) or a No. 20 (0.020 inch) slot size and was wrapped with filter cloth with an equivalent opening size (EOS) of 70 to 140 (i.e. No. 70 to No. 140 U.S. Standard Sieve Size). The filter cloth was secured to the well screen with nylon straps. When drilling and constructing these wells, the drilling and cleaning procedures detailed in Section 8.0 of this report were followed.

10.3 Installed Well Locations

The borehole locations and final locations of the wells installed during the second phase of the well installation program are shown on Figure 3. The boring logs and well logs for these installations are included in Appendicies A-2 and B, respectively. Well construction details are summarized in Table 1.

Wells P-8, P-18, P-19, P-20 and P-21 were located, based on the OVA measurements taken during their installation, outside the contaminant plume on the first drilling

attempt. Wells P-10, P-11 and P-12 had to be moved to a second location before the OVA measurements indicated they were outside the plume. After these wells were installed and groundwater samples were obtained and subjected to laboratory analyses, volatile organics identified in Wells P-10 and P-18 indicated that these wells are contaminated rather than being uncontaminated as indicated by OVA testing of the auger cuttings.

Wells P-14 and P-17 were also planned to have been installed outside the plume. Access to Well P-14 was very difficult because of wet, soft ground and there was no reasonably accessable alternative location at the time of installation. Thus, Well P-14 was installed even though the OVA data indicated contamination. Well P-17 was also planned to have been installed outside the plume. However, after being relocated the soil boring showed significantly higher contamination than the first boring closer to the plume. Therefore, a well was installed and completed to a depth of 20 feet below the ground surface.

The locations for Wells P-6, P-7, P-9, P-13, P-15, and P-16 were established for purposes other than being outside the suspected contaminant plume so the OVA was not used to analysis the cuttings as these wells were drilled. Well P-6 was installed upgradient of the plume to obtain background data. Well P-7 was installed within the staging area used during the initial clean-up to investigate for possible contamination. Wells P-9, P-13, P-15 and P-16 were located to provide additional hydrogeologic and contaminant data. It should be noted that initial attempts to install Wells P-15 and P-22 were unsuccessful due to the "running sand" characteristics of the soil. The sand would bind in the annulus between the auger and the well pipe thus making it

impossible to remove the auger without pulling the well pipe out also. Well P-15 was installed about 100 foot from its initially planned location and Well P-22 was installed about 25 feet from its initially planned location.

Well development was accomplished with a surge block and a 1.7-inch hand pump. Developed wells were surged two to three times with about 80 gallons of water being removed from most of the wells. Many of the wells have silted slightly, probably because of the finer-grained material within the upper portion of the aquifer. The last four wells installed (P-19, P-20, P-21, and P-22) were not developed because of anticipated siltation and time restrictions. The details of the well development are presented on the monitoring well logs in Appendix B.

10.4 Second Phase Sampling

10.4.1 General

The second phase sampling program was completed in two stages similiar to the second phase well installation program as described in Section 10.1. During the first stage of the sampling, conducted in September 1985, water samples were obtained from Wells BP-1 through P-16, W-8, W-9, and W-10. Samples were also collected from Myers Creek (the first surface water downgradient of the site) at the location shown on Figure 3. The second stage of the sampling was conducted in December 1985 and consisted of obtaining water samples from wells BP-3-1, and BP-5 through P-22. Because the initial sampling program (Section 8) indicated the chemicals compounds in the groundwater were primarily volatile organics, samples collected in the second phase sampling program were typically analyzed only for volatile

organics. Details on the sampling procedures and results from both samplings are presented in the following subsections.

10.4.2 Sampling Procedures

The following step-by-step procedure was used to obtain samples from wells P-6 through P-22 for volatle organic analysis:

1. The wells were inspected for damage or evidence of inadvertent entry. Any such evidence was noted on the Sample Collection Form.

2. The water level sounding probe and bottom five feet of cable was rinsed three times with distilled water. The depth to the water surface in the well from the top of PVC casing was then measured and recorded.

3. The stainless steel bailer was rinsed with acetone followed immediately with a triple rinse using distilled water. New rope was installed on the bailer.

4. The volume of water in one well bore volume was calculated and the well was purged by removing 2 bore volumes from the well. The flow of water was directed into a five-gallon container to measure the volume of water removed. Two bore volumes were considered adequate well purging since all of these wells had sand packs formed from all in-situ materials.

5. After purging the well and recording the volume removed, a bottom feed bailer was lowered slowly into the well. The bailer was then slowly removed from the well and the water from the bailer was poured into a 40 ml clear glass sample vial. This process was repeated for a duplicate sample. When recovering a sample care was taken not to aerate the sample and the sample vial was filled completely so there was no entrapped air.

6. The vials were labeled immediately and placed on ice in a cooler.

7. The bailer was again lowered into the well to obtain a sample of water to measure and record temperature, ph, and specific conductance. Three replicate measurements were made of these parameters. The ph/conductivity meter and thermometer were triple rinsed with distilled water prior to use.

8. The Sample Collection Form was completed. All equipment used for sampling was rinsed with distilled water and the bailer rope discarded. The cap was placed on the well and the protective cover locked.

Additional samples were obtained from Well P-6 during the first stage of sampling to further define the background water quality of the surficial aquifer. These samples were collected in four amber glass 1 liter bottles. Three of the bottles were filled with water directly from the bailer and one was filled with water from a bailer that was filtered using a peristaltic pump and an in-line 0.45-micron filter. The filtered sample was preserved with 5 milliliters of nitric acid for metals analysis.

Samples from Wells BP-1 through BP-5 were obtained by using 1/4 inch tubing and compressed nitrogen to raise the water to the ground surface from the small diameter piezometers. Each of these wells consists of several piezometer tips. An attempt was made to obtain a 40 milliliter sample from each tip. In Wells BP-3, BP-4, and BP-5 one of the piezometer tips consists of a 2 inch PVC pipe with a screened section at the bottom. These tips were sampled with a bottom feed stainless steel bailer using the same procedures employed to sample Wells P-6 through P-22.

The sample for volatile organic analysis from Myers Creek was obtained by holding a sample vial just below the water surface so it filled slowly and with a minimum of turbulance. The vial was then held upright below the water to assure there would be no entrapped air.

In December 1985, Well BP-3, tip 1 was sampled in an attempt to determine if there were any non-aqueous phase liquids (NAPL) present in the lower portion of the surficial aquifer. Such liquids, if present, would tend to sink to the bottom of the aquifer since the compounds at Bluff Road are denser than water. Well BP-3, tip 1 was chosen for sampling because the screen penetrated 0.9 feet into the Black Mingo clay, thus forming a "cup" where NAPL's might collect if present. This well was sampled on December 22, 1985. A 1/4 inch tube was inserted to the bottom of the well. A peristaltic pump was then attached to the top of the tube and used to draw about 40 ml into the 1/4 tube. The top of the tube was then sealed and the tube removed from the well. A 40 mil glass sample vial was then filled with the fluids in the bottom of the tube. Two sample vials were filled in this manner, then stored in a location where no mixing or shaking would occur. After several days both samples were examined to determine if they had separated into one or more phases or if non-aqueous phase "droplets" were suspended in the water. None of these effects were observed and it was concluded that the samples did not contain any non-aqueous phase liquids.

As part of the quality assurance program, trip blanks were prepared and several field blanks were also taken during each stage of sampling. Two trip blanks of distilled water were prepared by the laboratory prior to sampling and accompanied the samples at all times. These trip blanks

served as checks on the procedures used by the chemical lab to clean the sample vials. In addition two blanks were prepared by pouring distilled water from the bailer (after cleaning) into a vial to determine whether there was any residual contamination from other wells or the cleaning process. During the first stage of sampling a third blank was obtained by running distilled water through the peristaltic pump and filter apparatus into a vial. Chemical analysis of these blanks showed that the concentration of volatile organic compounds was below the Method Detection Limit in all blanks. This shows that the sampling procedures and apparatus were sufficient to prevent cross-contamination of samples.

10.4.3 Analytical Results

Results of the chemical analyses on groundwater samples from the second phase sampling are presented in Appendix E. The results of the volatile organic analyses are summarized in Table 2.

Monitoring well P-6 was installed up-gradient of the site and represents background water quality in the surficial aquifer. Samples from well, P-6 had pH values of 5.4 and 6.1, and specific conductance values of 76 and 85 umhos/cm at 25°C, in September and December respectively. No volatile, acid or base/neutral organic compounds were detected at a detection limit of 5.0 ppb. No pesticides or PCB's were detected at a detection limit of 1.0 ppb. All trace metal concentrations were below the detection limit of 0.01 ppm. The cyanide concentration was less than the detection limit of 0.02 ppm. Total phenol was less than the detection limit of 0.10 ppm. A sample from well P-6 collected by SCDHEC on October 11, 1985 did show traces of four volatile organic compounds at concentrations between 3 ppb

and 8 ppb. These results are also reported in Appendix E. Thus background water is characterized as having specific conductance of less than 100 umhos/cm, slightly acidic, and no detectable trace metal contaminants, and generally no organic compounds at concentrations above 5 ppb.

The wells which showed the most contamination in the second phase sampling were P-10, P-13, P-14, P-16, BP-1, BP-3 and BP-4. These wells had total volatile organic concentrations ranging from 4403 ppb to 45,295 ppb and concentrations of some individual volatile organic compounds typically in the hundreds or thousands of parts per billion. Monitoring well P-9 had a lesser degree of contamination with concentrations of individual compounds were between the MDL and 191 ppb.

The list of volatile organic compounds most commonly found in the groundwater is essentially the same as those determined during the Spring sampling (Section 8). The following compounds were most often found in the highest concentrations typically above 1000 ppb:

Chloroform	Tetrachloroethylene
1,1-Dichloroethane	Toluene
1,1-Dichloroethylene	1,1,1-Trichloroethane
Methylene Chloride	Trichloroethylene
1,1,2,2-Tetrachloroethane	

Although present in some wells at concentrations above 1000 ppb in the Spring, 1,2-Trans-Dichloroethylene was not detected in any of the samples obtained during the second phase sampling. Wells P-19, P-20, P-21, and P-22 were installed to define the leading edge of the contaminant plume. These wells were sampled in December, 1985. Wells

P-19, P-20, and P-21 had no volatile organic contaminants above the MDL. P-22 was closer to the source than P-19, P-20, and P-21, and had 249 ppb of methylene chloride and 36 ppb of carbon tetrachloride. Methylene chloride is a relatively mobile contaminant and likely indicated the leading edge of the contaminant plume. No volatile organic compounds were detected in the samples collected from Myers Creek.

A few wells, P-7, P-17, and P-18, showed signs of contamination that were outside the suspected boundaries of the plume. These will be discussed below.

During the initial phases of site clean-up, two locations adjacent to the SCR&D facility was designated as a staging areas for drum removal. One of the staging areas was the Campbell's Garage property, and the other was located just northwest of the site. Monitoring Well P-7 was installed to determine the groundwater quality in the northwest area. In the September sampling, volatile organics detected in water from this well included chloroform, tetrachloroethylene, 1,1,1 trichloroethane, 1,1,2 trichloroethane and trichloroethylene and concentrations between 1,048 ppb and 33 ppb. In the December sampling, concentrations of all of these compounds decreased. The December concentrations were between 400 ppb and below the MDL. Complete results are reported in Table 5 and Appendix E.

During the installation of monitoring Well P-17, an OVA reading of 40 ppm was recorded, strongly indicating groundwater contamination. When complete, this well had a strong organic sulfur odor. Samples were collected November 19, November 26 and December 4. In the first sampling no vola-

tile organics were detected above the MDL. In the second sampling toluene, 1,1,1 trichloroethane and trichloroethylene were detected in concentrations of 419, 605 and 60 ppb, respectively. In December, concentrations of 27 ppb chloroform, 19 ppb of 1,1,1 trichloroethane and 12 ppb of trichloroethylene were detected.

Monitoring well P-18 was sampled twice in December. Volatile organic compounds similar to those found in the leachate plume were detected. These included carbon tetrachloride, chloroform, 1,1 dichloroethylene, 1,1,2,2 tetrachloroethane, tetrachloroethylene, 1,1,1 trichloroethane, 1,1,2 trichloroethane and trichloroethylene in concentrations from 456 ppb to 32 ppb.

11.0 PUMPING TEST

In December 1985 a pumping test was conducted in the surficial aquifer at the Bluff Road Site. The purpose of the test was to better determine the hydraulic conductivity of the surficial aquifer with a higher degree of confidence than could be obtained using the results of grain size analyses of soil samples.

The pumping well used for the test, Well O-1, is located about 800 feet from Bluff Road in the vicinity of Wells P-8 and P-9. The pumping rate during the test was 102.7 gallons per minute and was maintained for about 23 hours. Water levels in monitoring wells within approximately 500 feet of the pumping well were monitored throughout pumping and for approximately 24 hours after the cessation of pumping. Water level measurements in individual monitoring wells were used to calculate the hydraulic conductivity of the surficial aquifer and the results are reported in Table 3. The average hydraulic conductivity calculated using pumping test results was 3.4×10^{-2} cm/sec. Samples of the well discharge were collected and analyzed for priority pollutant volatile organic compounds. A complete description of methods, data collected, analysis, and results of the pump test is included as Appendix H of this report.

12.0 TREATABILITY STUDIES

Laboratory treatability studies have been conducted on contaminated soil and groundwater samples collected at the Bluff Road site. The purpose of these studies was to obtain data pertaining to the effectiveness of aeration in removing contaminants from groundwater and of spray irrigation in leaching contaminants from soil.

The effectiveness of aeration was evaluated by subjecting a sample of contaminated groundwater to vigorous aeration over a period of time. Water samples were periodically taken from the aerator and tested for volatile organic compounds. The results of these tests show that the concentration of volatile organic compounds in the test sample was decreased 90% by 45 minutes of vigorous aeration. A complete description of the test methods and results is included as Appendix J of this report. These results indicate that aeration should be strongly considered as a part of the remediation system at this site.

Spray irrigation is a potential remedial measure which might be used to remove contaminants present in the on-site soils above the groundwater table. This method would involve spraying water onto the ground surface so that this water would infiltrate through the unsaturated on-site soils, dissolving chemicals present in the soil, and "flushing" the chemicals into the groundwater where they would be collected and treated along with the contaminated groundwater. This "flushing" process was modeled in the laboratory by percolating water through an undisturbed sample of soil from the site. The outflow from the soil was periodically tested for volatile organic compounds so that the time rate of leaching could be determined. Tests on two soil samples resulted in an observed reduction in leached

volatile organic compounds of 66%. Appendix J contains a complete description of the methods and results of the leachability tests. These results indicate that spray irrigation should also be strongly considered as a part of the remediation system at this site.

13.0 SITE SPECIFIC STRATIGRAPHY

13.1 Topography

The study area is located in a flat low lying area between South Carolina Highway 48 (Bluff Road) and Myers Creek (Figure 3). Bluff Road, which bounds the southwest side of the study area, is a local topographic high. The land west of Bluff Road slopes toward the west, draining into the Congaree River and Mill Creek. The land east of Bluff Road, which includes the study area, slopes gently eastward toward Myers Creek, a tributary of the Congaree River. Wooded land outside the former facility boundary commonly has ponded water in many areas for several days after a heavy rainfall. Property east of Myers Creek drains westward back into the creek. Myers Creek flows through a broad, swampy area where soft soils and standing water is common.

In the study area several drainage ditches influence local drainage. The location of these ditches has been reported by EPA and SCDHEC (References 1 and 2). One ditch noted in these previous investigations extends from the vicinity of the on-site lagoon southward past Well P-17 toward Bluff Road.

13.2 Stratigraphy

The type, depth, and extent of soil strata present at, and adjacent to, the site have been inferred using the results of the field investigations, laboratory tests, and results of previous investigations on and near the site (References 1, 2, 4). The soil profile at the site generally consists of a sandy soil approximately 50 feet thick underlain by a stiff gray clay at least 10 feet thick. Beneath the clay lies a layer, approximately 50 feet thick,

of interbedded clay and clayey sands. This is underlain by fine to medium sands of the Middendorf Formation. More detailed discussions of the characteristics of each of these strata are presented in the following sections and illustrated on Figure 7.

13.2.1 Surficial Strata

The surficial sand layer was investigated more extensively than the other strata with a total of 50 borings being made. The borings indicate that within about 15 feet of the ground surface there is considerable variation in soil characteristics both horizontally and vertically. Below a depth of about 15 feet nearly uniform conditions were observed throughout the site.

Borings east of Well BP-5 indicate that brown clay or silty clay with a trace of fine sand extends from the ground surface to a depth of between 6 feet and 17.5 feet. Where the silty clay thickness is less, there is typically a transition zone of fine sand with silty clay extending to about 15 feet. Borings P-17, P-18, P-19, and T-10 differ slightly, indicating a layer of brown sand and clay to a depth of between 9.0 feet and 14.5 feet. This layer has only a slightly lower percentage of fine particles than that found in the other borings, thus supporting the general trend that, west of Well BP-5, the soil is generally fine grained to a depth of about 15 feet. The results of grain-size analyses conducted on representative samples of this soil are reported in Table 4 and Appendix F.

The borings west of, and including, BP-5 indicate soils within 15 feet of the ground surface are primarily fine sand with some silt or silty clay. Borings BP-1 through BP-4 and ST-6 through ST-19 indicate that the sand with some silty

clay is restricted to a layer beneath the former SCR&D facility. This layer varies in depth, but is about 8 feet deep at the fence line nearest Bluff Road and slopes upward to an apparent outcrop along a line from BP-4 to BP-2. Soil above and below this layer is typically a fine sand with some silt extending to a depth between 12.5 feet and 15 feet. Other soils east of BP-5 are generally fine sand with some silt extending to a depth of between 6.4 feet and 15 feet. Typical samples were selected for grain-size analysis and the results are presented in Table 4 and Appendix F.

Below a depth of approximately 15 feet all borings encountered similar conditions. A strata of tan fine to coarse sand with little to trace silt was observed beginning at depths between 6 feet and 17.5 feet. This strata tends to become coarser and contain less fines as depth increases. The strata terminated at depths ranging from 40.0 feet to 52.0 feet where the stiff, gray clay of the Black Mingo Formation was encountered. Representative samples of this strata were selected for grain-size analysis. The analysis results, reported in Table 4 and Appendix F, indicate that the strata is very uniform and extends laterally across the entire area studied.

13.2.2 Deep Strata

The deep strata at the site, the Black Mingo and Middendorf Formations, were investigated by three borings, DW-1, DW-2, and DW-3. The Black Mingo Formation was fully penetrated and found to contain four separate units. The Middendorf Formation was only penetrated 17.5 feet.

The upper portion of the Black Mingo is a very stiff, light gray to black clay at least 10 feet thick and which appears to be both continuous and homogenous across the

study area. This clay layer is underlain by about 50 feet of interbedded layers of fine to medium sand with some silty clay or silt and silty clay with fine sand. This lower interbedded zone is underlain by gray stiff silty clay with a trace of sand. This stiff silty clay layer was encountered in borings DW-1 and DW-3. However, only DW-1 fully penetrated the layer, encountering a 17 foot thickness.

The Middendorf Formation, which constitutes the regional water supply aquifer, was encountered only in Well DW-1. A fine to medium sand with trace to some silt was encountered at a depth of 126.5 feet and extended to a depth of 143.5 feet. At this depth a hard white silty clay with a little sand was encountered. Boring DW-1 was terminated at a depth of 144 feet.

14.0 SITE HYDROGEOLOGY

14.1 Hydrostratigraphy

There are two aquifers present within the study area. The saturated portion of the surficial sand comprises the uppermost aquifer. The deeper sands present in the lower Black Mingo and Middendorf Formations constitute at least one confined aquifer. The layer of gray clay present at a depth of about 50 feet to 60 feet serves as an aquitard and restricts groundwater flow between the deeper confined aquifers and the surficial unconfined aquifer.

14.2 Piezometric Levels

Water level measurements were made in the monitoring wells several times during 1985, and are summarized in Table 5. Measurements made in surficial aquifer wells have been used to define the position of the water table, or piezometric surface, in the surficial aquifer. A contour map representing the piezometeric surface of the surficial aquifer in December 1985 is presented in Figure 8. This shape of this piezometric surface is typical of those observed at the site by Golder Associates throughout 1985 although the absolute values vary corresponding to wet and dry seasons.

Figure 8 also shows the direction of groundwater flow in the surficial aquifer to be east, toward Myers Creek. This is in the direction of local topographic relief. The horizontal hydraulic gradient, or slope of the piezometric surface, is approximately 0.0050 to 0.0028 in the vicinity of the site, and flattens out in the direction of flow to about 0.0007 near well P-19. It is anticipated that the gradient flattens out even more as flow approaches Myers Creek. It is also possible that during the wet season

increased rainfall may flatten the piezometric surface and reduce the horizontal hydraulic gradient. However, Golder Associates has not, to date, observed any flattening or reduced gradients associated with rainfall.

The installation of some multi-level piezometers in the surficial aquifer allowed the calculation of vertical gradients. The two multi-level piezometers furthest west, BP-1 and BP-3, exhibited strong downward gradients. The vertical gradients in BP-1 were 0.015 and 0.011 in January and April 1985, respectively. In BP-3, the vertical gradients were 0.014 and 0.015 in April and September 1985, respectively. Eastward in the direction of groundwater flow, at BP-2 and BP-4, the downward vertical gradients were less strong. For BP-2, the vertical gradients were 0.006 in February 1985 and 0.003 in April 1985. For BP-4 the vertical gradient was 0.005 in both April and September 1985. The presence of downward vertical gradients in the vicinity BP-1 through BP-4 indicates that there is a downward component of groundwater flow in the surficial aquifer in this area. At BP-5, the bundled piezometer furthest along the flow path, the vertical hydraulic gradients were negligible, indicating essentially horizontal flow.

The piezometric levels in the lower confined aquifer were approximately five feet below the levels in the surficial unconfined aquifer. The resulting downward gradient across the Black Mingo clay aquitard, computed between the screens in Wells BP-2 and DW-1, is approximately 0.08. This gradient indicates that, given enough time, groundwater from the surficial aquifer will flow through the Black Mingo clay into the underlying confined aquifer. The direction of horizontal flow in the confined aquifer was not determined

by this investigation. However, investigators at the Westinghouse Electric Corporation Plant report that flow in the aquifer is toward the south (Reference 4).

14.3 Hydraulic Conductivity

The hydraulic conductivity of several of the strata were determined using field and laboratory test results. Hydraulic conductivity in the surficial aquifer was calculated using the results of grain size analyses and a 24-hour field pumping test. The permeability of the Black Mingo clay and the underlying strata were determined by laboratory permeability tests.

In the surficial aquifer the results from the pump test analysis indicate a hydraulic conductivity ranging from 2.4 x 10^{-2} cm/sec to 7.0 x 10^{-2} cm/sec. Using Hazen's approximation and the results of grain size analyses, the hydraulic conductivity was estimated to be between 3.6 x 10^{-2} cm/sec and 22 x 10^{-2} cm/sec. The pump test provided an averaged value over the entire aquifer thickness at the well while Hazen's approximation determined a hydraulic conductivity value for the discrete interval sampled. In instances where values were calculated from both methods at a single well, the agreement between the two methods was very good provided the well screen interval and the depth of sample for grain size analysis were consistent. For Wells P-13, P-15, and BP-1 the agreement between the two methods was only fair, with Hazen's approximation resulting in a hydraulic conductivity five to ten times greater than that calculated from the pump test. For these wells, hydraulic conductivity values from Hazen's approximation may have been biased to a slightly higher number due to problems with running sand encountered during drilling and sampling. The sampling spoon often had to be washed down the hole to the

desired sampling depth. This may have washed out some of the fine grained particles from the sample, making the resulting sample slightly coarser than the in-situ soil. Also, the surficial aquifer tended to become coarser with depth. Most of the grain size samples for Hazen's approximation were collected from deeper portions of the strata which likley resulted in greater hydraulic conductivities.

All of the hydraulic conductivities calculated for the surficial aquifer are summarized in Table 3. The values resulting from the pumping test analysis is considered the most reliable determination because the test measured the response of a large volume of undisturbed soil. Therefore, a hydraulic conductivity for the surficial aquifer of 4×10^{-2} cm/sec is considered representative of aquifer conditions.

The hydraulic conductivity of the black, plastic clay which underlies the surficial aquifer was determined in the laboratory. Two undisturbed samples of this clay were back-pressure saturated in a triaxial chamber after which water was forced to flow through the samples. The tested hydraulic conductivities were 9.4×10^{-9} cm/sec and 8.6×10^{-8} cm/sec. These values, along with the results of other soil tests on this sample, is reported in Table 4.

14.4 Groundwater Flow Velocities

Average groundwater velocities were calculated using the Darcy equation adjusted for effective porosity:

$$v = \frac{ki}{n_e}$$

where v - average linear groundwater velocity
k - hydraulic conductivity
i - hydraulic gradient
n_e - effective porosity

Using a value of 4×10^{-2} cm/sec for hydraulic conductivity, an assumed effective porosity of 0.35 and gradients of 0.0050, 0.0028 and 0.0007, average linear groundwater velocities of 56 feet per month, 32 feet per month, and 8 feet per month, respective to gradients, were calculated. These values represent the range of groundwater velocities which have been observed at the site. During wet seasons it is possible the velocities may decrease if rainfall results in lower hydraulic gradients. To date, no such lower gradients have been observed by Golder Associates.

Using a hydraulic conductivity of 5×10^{-8} cm/sec for the hydraulic conductivity of the aquitard, a gradient of 0.08, and assuming an effective porosity of 0.2, the average linear flow velocity which might be expected across the aquitard would be approximately 2×10^{-3} feet per month.

14.5 Flow Regime

Two flow regimes exist at the site which are somewhat independent of each other. Although specific data was not collected for the deeper confined aquifer, regional information suggests flow in a south or southeast direction towards the Congaree River. A more localized groundwater flow pattern exists for the uppermost aquifer. Near Bluff Road, a local topographic high, and in the vicinity of the former SCR&D site vertical gradients are downward indicating a local recharge zone. Near BP-5 the vertical gradients are negligible indicating flow has become primarily horizontal. It is anticipated that local discharge occurs in the marshy area near Myers Creek.

15.0 CONTAMINATION ASSESSMENT

15.1 Soil Contamination

A review of the results of investigations by EPA and Golder Associates indicates that the unsaturated soil within the former boundaries of the SCR&D facility is contaminated with volatile organic chemicals and metals. These contaminants constitute a continuing source of chemicals which can leach into the groundwater. Golder Associates investigation suggests that the contaminated area extends from Bluff Road in a northeast direction to the former fence line at the rear of the facility, and appears to be bounded by the former fence lines which run perpendicular to Bluff Road. In February 1986, Golder Associates learned from SCDHEC that the Campbell's Garage property had been used as a staging area during initial phase of the site cleanup and that some drums of chemicals were spilled here during the cleanup. Also, surface runoff from the former SCR&D facility does corss a portion of the Campbell's Garage property. Therefore, it is likely that this property is also contaminated.

Within the contaminated area, the contamination extends from the ground surface to a depth of at least 15 feet. Soil contamination is believed to extend down to at least the water table within the former SCR&D facility boundaries. Analysis of a composite soil sample for priority pollutants indicates that the only compounds detected in the soil are volatile organics and metals. Analysis of 18 individual soil samples for volatile organics indicates that five compounds frequently present are:

Benzene	Chloroform
Methylene chloride	Toluene
1,1,1 Trichloroethane	

The observed concentration of volatile organic compounds varied from the Method Detection Limit to 23,465 parts per billion (ppb). However, due to the difficulties in testing soils for volatile organics discussed in Section 5.1, the absolute levels of organic contaminants indicated by test results may not be as high as actual in situ concentrations.

Test results on the composite soil sample indicated the possible presence of phenols in the soil. Since phenols were also observed in a groundwater sample taken from Well BP-3, it therefore seems likely that phenols are also present in at least a portion of the unsaturated soils. Concentration of metals in the composite sample varied from the Method Detection Limit to 7.0 parts per million (ppm). Four metals, selenium, zinc, copper, and chromium, were present at concentrations greater than 0.1 ppm.

15.2 Lagoon Contamination

Golder Associates investigation indicates that the water present in the on-site lagoon did not contain any priority pollutant organic compounds at the time of sampling. Samples were taken in January and November of 1985 thus suggesting that surface runoff from the former SCR&D facility into the lagoon is not presently contributing measurable organic contamination to the lagoon water. Tests on six water samples collected in January 1985 indicated that some metals are present in the water. In particular, the concentrations of copper, arsenic, and chromium vary 0.5 ppm to 10.6 ppm. The analyses indicate that, at the time of investigation, the water in the on-site lagoon was not contaminated with priority pollutant organic compounds.

The sediments in the bottom of the existing lagoon were also sampled by Golder Associates, in January 1985. The sediments appeared to be lime and likely remain from the acetylene manufacturing operation formerly conducted on the property. The sediment had a pH of 11.5, as would be expected with lime. Analysis of a composite sediment sample for priority pollutants indicated the presence of two organic compounds, ethylbenzene (23 ppb) and napthalene (18 ppb). Metals present in the largest concentration were magnesium and sodium. Some priority pollutant metals were present but at concentrations less than 20 ppm and include copper, arsenic, zinc, chromium, lead, nickel, and beryllium. Therefore, the analyses indicate that the lime sediments in the bottom of the existing lagoon are slightly contaminated. These contaminants are primarily metals.

15.3 Above-ground Tank

The above-ground tank is located on-site just inside the fence near Bluff Road and contains a highly toxic sludge. The sludge consists of 33,300 ppm of 2-chlorophenol and 13,774 ppm of phenol. Several other acid and volatile compounds were detected in much lower concentrations. Golder Associates has been informed by an industrial hygienist that the compounds present in the tank are at such high concentrations that direct dermal contact with the sludge would pose an immediate danger to life and health. We also understand that short-term exposure to the vapors emanating from the tank poses a health hazard. Therefore, the tank is considered to be highly contaminated and should be removed from the site.

15.4 Groundwater

15.4.1 Surficial Aquifer Contaminant Plume

The extent of contaminated groundwater in the surficial aquifer has been determined using the results of chemical analyses on water samples obtained from the monitoring wells in 1985. These analyses indicate that a plume of contaminated groundwater extends from the site toward the east approximately 2300 feet. The plume is about 1000 feet wide. The plume of contaminated groundwater is, as expected, migrating in the direction of groundwater flow. Because Well P-6, upgradient of SCR&D facility, does not indicate contamination, the analyses clearly show that the former SCR&D facility is the source of the contamination. The probable source of contamination is chemicals spilled on the ground surface and chemicals remaining in the soil within the former facility boundaries. The contaminant plume present in the surficial aquifer in September and December, 1985 is shown on Figures 9 and 10, respectively. The extent of contaminated groundwater is indicated by the total concentration of volatile organic compounds present in the groundwater. The concentration and extent of individual chemical compounds has also been examined. Although some differences exist, the extent of contamination indicated by the total volatile concentration is consistent with most of the individual compound contaminant plumes.

Figures 9 and 10 indicate two zones of highly contaminated water. One zone is at the source of groundwater contamination, the SCR&D site. The second zone is located approximately 1000 feet downgradient and is centered about monitoring wells P-14 and P-16. The chemical composition of the two zones is very similar, indicating that the zone centered about P-14 and P-16 has migrated from the site and constitutes a plume of contaminated groundwater.

The first zone of highly contaminated groundwater is located at the former SCR&D facility where the total concentration of all volatile organic compounds is typically around 10,000 ppb. Concentrations as high as 45,295 ppb have been observed in Well BP-1. Individual volatile organic compounds are present in concentrations typically in the hundreds or thousands of parts per billion. Volatile organic compounds frequently present are:

Chloroform	Methylene Chloride
1,1 Dichloroethane	Toluene
1,1 Dichloroethylene	Tetrachloroethylene
1,1,2,2 Tetrachloroethane	1,1,1 Trichloroethane
Trichloroethylene	

A priority pollutant scan on a sample collected in the Spring of 1985 from a highly contaminated well (BP-3, tip 3), revealed three phenolic acids and three chlorinated benzenes in concentrations from 4 ppb to 281 ppb in addition to volatile organic compounds. No trace metals were detected in this sample. The analysis results indicate that the primary groundwater contaminants were volatile organic compounds.

The second zone of highly contaminated groundwater, centered about Wells P-14 and P-16, typically has total volatile organic concentrations between 11,366 ppb and 21,618 ppb. The individual compounds frequently present are similar to those present around the former SCR&D facility and typically have concentrations in the hundreds or thousands of parts per billion.

Between the two highly contaminated zones, there is an area in the vicinity of Wells BP-5 and P-15 of apparently lower contamination. Total volatile organic concentrations present in the groundwater are typically 100 ppb to 1100 ppb. The individual compounds present in the wells in this areas are, however, similar to those present in the highly contaminated zones. There are two possible explanations for this area of apparently low concentration.

It is possible that the lower concentrations are evidence of a relatively narrow, high permeability "corridor" that extends from the former SCR&D site to the vicinity of Wells P-14 and P-16. This high permeability corridor, if it exists, apparently by-passes Wells BP-5 and P-15. The subsurface conditions noted at Boring T-6 indicates the possible existence of a high permeability corridor. Well P-15 was originally to be located at the site of Boring T-6 but severe problems with running sands flowing up inside the hollow stem auger drill stem prevented the installation of the well at this location. Running sands are often indicative of sand with a very low percentage of fine particles and are usually highly permeable. Also, the results of the soil gas survey (Figure 6) indicated a narrowing of the plume of contaminated soil gas in the area between Wells BP-5 and P-15. Finally, the existence of a high permeability zone is not inconsistent with the environment under these soils were deposited. Water deposition frequently results in variations in soil deposits over short distances. Therefore, it is possible that the zones of highly contaminated groundwater are not two separate zones but are possibly connected by a high permeability corridor which is likely to contain contaminant concentrations similar to those in the highly contaminated zones but not directly measured by the monitoring wells.

A second possible explanation suggests that the area of low concentration reflects groundwater flow that has occurred since the site cleanup in 1982 and 1983. Such flow might exhibit lower concentrations of chemicals since leaking drums were no longer present at the site. Using this explanation, the area of high concentration around Wells P-14 and P-16 could be a slug of contaminants due to excessive leakage of waste chemicals during the facility operation and cleanup. This explanation is consistent with estimated groundwater flow velocities provided that leakage from the site was significant from about 1979 until the Spring of 1983.

The leading edge of the plume, downgradient (east) of Well P-16 was investigated by the installations of Wells P-19 through P-22. Wells P-19, P-20 and P-21 had no contaminants at concentrations above the MDL. Well P-22 showed concentrations of 249 ppb of methylene chloride and 36 ppb of carbon tetrachloride. Methylene chloride is a relatively mobile contaminant and likely indicated the leading edge of the contaminant plume.

15.4.2 Contamination Outside the Plume

During the initial phases of site clean-up, an area was designated as a staging area for drum removal. Monitoring Well P-7 was installed to monitor the groundwater in this area. In September and December, 1985 volatile organics were detected in water sampled from this well at concentrations between the MDL and 1,048 ppb. Because this area is up-gradient of the site, and because it was used as a staging area during site clean-up, this contamination is not believed to be part of the contaminant plume emanating from the site. The actual zone of contaminated water monitored

in this well is expected to be very local to the well. However, because the well is up-gradient of the SCR&D facility, the flow of contaminated groundwater will be through the site where it will join the contaminant plume.

Samples from Monitoring Well P-17 were shown to be contaminated with organic compounds similar to those found in the downgradient contaminant plume. The total concentration of volatile organic compounds, as indicated by three samples, varied from the MDL to 1089 ppb. However, the contamination of groundwater at this location is not considered to be part of the downgradient plume. Monitoring Well P-12 lies between the site and Well P-17. Although Well P-12 had 60 ppb of tetrachloroethylene in the September sampling, no volatile organic contaminants were detected above MDL by the December sampling. Consequently, Well P-12 is believed to be clean. It is possible, but unlikely that contamination could reach Well P-17 without also being detected at Well P-12. A more likely reason for the contamination at Well P-17 would be the drainage ditch that runs from near the site to the Well P-17 area. Contaminated surface water could have flowed down this ditch to the vicinity of Well P-17 where it infiltrated into the groundwater. Another possible source of contamination is Bluff Road itself. A spill along the roadway in the vicinity of Well P-17 could account for the contamination. Additional investigation in this area is recommended.

Monitoring Well P-18 was found to be contaminated with the volatile organic compounds which were commonly found in the contaminant plume. The total concentration of volatile organics was between 1000 ppb and 1500 ppb. Although a finger of contaminated groundwater migrating from the site to Well P-18 is possible, it is unlikely that this is the

case. The well itself is not down-gradient from the site and lies roughly 1000 feet from the center line of the plume in a direction roughly perpendicular to the direction of groundwater flow. Also, Wells BP-2 and P-8 are located between the site and Well P-18. Both these wells are essentially clean. Although at this time the relationship is only speculative, a logging road does run near this well, and may be potentially related to its contamination. Additional investigation in this area is recommended.

15.4.3 Deep Strata

The deep strata present in the study area consist of the Black Mingo and Middendorf Formations. The strata were penetrated by Wells DW-1, DW-2 and DW-3 which were screened below the clay layer present at the top of the Black Mingo Formation. Groundwater samples collected from these wells in the Spring of 1985 did not detect any volatile organic compounds. Therefore, the strata being monitored are currently considered to be uncontaminated. Further, the clay layer at the top of the Black Mingo Formation is apparently present throughout the study area and significantly restricts, but does not totally prevent the downward flow of contaminated groundwater. However, the major water supply aquifer of the Middendorf Formation is not considered to be in jeapordy of contamination from the former SCR&D site at this time.

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LIST OF ABBREVIATIONS

The abbreviations and terms commonly employed on each Boring Log, on the Figures, and in the text of the report, are as follows:

C	-	Coarse	RES	-	Residual
CA	-	Casing	RX	-	Rock
F	-	Fine	SA	-	Sample
FRAG	-	Fragments	SAT	-	Saturated
M	-	Medium	SM	-	Some
MIC	-	Micaceous	TR	-	Trace
NP	-	Non-plastic	WL	-	Water level
PH	-	Pressure hydraulic	WH	-	Weight of hammer
PM	-	Pressure manual			

TERMS AND DESCRIPTIONS

Soil Description	Range of Proportion
Trace (tr.)	0 - 5%
Little	5 - 12%
Some	12 - 30%
And	30 - 50%

Relative Density of Cohesionless Soils	N (blows/ft.)
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

Consistency of Cohesive Soils	Cu (psf)
Very soft	less than 250
Soft	250 to 500
Firm	500 to 1,000
Stiff	1,000 to 2,000
Very stiff	2,000 to 4,000
Hard	over 4,000

SAMPLE TYPES

AS	Auger Sample
CS	Chunk Sample
DO	Drive Open
DS	Denison sample
PS	Pitcher sample
RC	Rock core
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

SOIL TESTS

C	Consolidation test
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial
H	Hydrometer analysis
M	Sieve analysis
MH	Sieve & hydrometer analysis
U	Unconfined compression
UU	Unconsolidated undrained triaxial
V	Vane Shear

PENETRATION RESISTANCE

Standard Penetration Resistance, "N" = the number of blows required to drive a 2 in. OD splitspoon sampler one foot using a 140 lb. hammer falling 30 in.

LIST OF SYMBOLS

I. GENERAL

$\pi = 3.1416$

e = base of natural logarithms 2.7183

$\log_e a$ or $\ln a$, natural logarithm of a

$\log_{10} a$ or $\log a$, logarithm of a to base 10

t	time
g	acceleration due to gravity
V	volume
W	weight
M	moment
F	factor of safety

II. STRESS AND STRAIN

u	pore pressure
σ	normal stress
σ'	normal effective stress ($\bar{\sigma}$ is also used)
τ	shear stress
ϵ	linear strain
ϵ_{xy}	shear strain
ν	Poisson's ratio (μ is also used)
E	modulus of linear deformation (Young's modulus)
G	modulus of shear deformation
K	modulus of compressibility
η	coefficient of viscosity

III. SOIL PROPERTIES

(a) *Unit weight*

γ	unit weight of soil (bulk density)
γ_s	unit weight of solid particles
γ_w	unit weight of water
γ_d	unit dry weight of soil (dry density)
γ'	unit weight of submerged soil
G_s	specific gravity of solid particles $G_s = \gamma_s/\gamma_w$
e	void ratio
n	porosity
w	water content
S_r	degree of saturation

(b) *Consistency*

w_L	liquid limit
w_P	plastic limit
I_P	plasticity index
w_S	shrinkage limit
I_L	liquidity index $= (w - w_P)/I_P$
I_C	consistency index $= (w_L - w)/I_P$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
D_r	relative density $= (e_{max} - e)/(e_{max} - e_{min})$

(c) *Permeability*

h	hydraulic head or potential
q	rate of discharge
v	velocity of flow
i	hydraulic gradient
k	coefficient of permeability
j	seepage force per unit volume

(d) *Consolidation (one-dimensional)*

m_v	coefficient of volume change $= -\Delta e/(1+e)\Delta\sigma'$
C_c	compression index $= -\Delta e/\Delta \log_{10} \sigma'$
c_v	coefficient of consolidation
T_v	time factor $= c_v t/d^2$ (d, drainage path)
U	degree of consolidation

(e) *Shear strength*

τ_f	shear strength	
c'	effective cohesion intercept	in terms of effective stress $\tau_f = c' + \sigma' \tan \phi'$
ϕ'	effective angle of shearing resistance, or friction	
c_u	apparent cohesion*	in terms of total stress $\tau_f = c_u + \sigma \tan \phi_u$
ϕ_u	apparent angle of shearing resistance, or friction	
μ	coefficient of friction	
S_t	sensitivity	

*For the case of a saturated cohesive soil, $\phi_u = 0$ and the undrained shear strength $\tau_f = c_u$ is taken as half the undrained compressive strength.

16.0 SUMMARY

Golder Associates has completed a Remedial Investigation at the former South Carolina Recycling and Disposal (SCR&D) facility on Bluff Road south of Columbia, South Carolina. Previous investigations of this facility were conducted by the U.S. Environmental Protection Agency (1980) and the South Carolina Department of Health and Environmental Control (SCDHEC) (1981). Wastes at the site were removed during 1982 and 1983, partly under the provisions of the Comprehensive Environmental Response and Liability Act (Superfund). Golder Associates, under contract to SCDHEC, began investigating the type and extent of soil and groundwater contamination at the facility in November, 1984. These investigations have been completed and the findings, presented in this report, are summarized below.

Golder Associates has investigated the soil and lagoon conditions within the former SCR&D facility boundaries, and the groundwater conditions within and adjacent to the facility. These investigations show that there are six soil strata present at and near the facility. The uppermost layer, approximately 15 feet thick, is a fine sand with some silty clay or silt that becomes a silty clay with fine sand in the eastern portion of the study area. Below this lies a layer, approximately 35 feet thick, of fine to coarse sand with a trace of silt. This relatively clean sand has a hydraulic conductivity of approximately 4×10^{-2} cm/sec and is the uppermost aquifer in the study area. The water table is encountered at a depth of about 5 feet to 10 feet below the ground surface. Flow in the study area is toward the east with gradients between 0.0050 and 0.0007. The estimated groundwater flow velocity is between 56 feet/month and 8 feet/month. The clean sand is underlain by about 10 feet of gray to black plastic clay. Lab testing indicates that

this clay has a hydraulic conductivity of about 5×10^{-8} cm/sec. Therefore, the clay layer is effective in retarding the downward movement of groundwater.

The plastic clay is underlain by three other deeper strata. The first is an interbedded sand and silty clay approximately 50 feet thick. This is underlain by another gray silty clay layer about 15 feet thick. The deepest layer is the a fine to medium sand with some silt of the Middendorf Formation. This deepest layer is a confined aquifer used for water needs throughout the Columbia region.

Contamination assessments were made using the results of field observations and analyses on the above ground tank, soil, lagoon water, and groundwater samples. Chemical analysis indicates that the above-ground tank contains highly toxic sludge consisting primarily of 2-Chlorophenol and Phenol. Contact with this sludge would pose an immediate danger to life or health. Soil contamination was indicated in each of eighteen borings made within the former facility boundaries and between the facility and Bluff Road. These borings suggest that on-site soil between the ground surface and the water table contains a number of volatile organic compounds. Water samples were taken from the on-site lagoon in both January and November 1985. Both samples indicated that volatile organic compounds were not present in concentrations above the Method Detection Limit.

The extent of contaminated groundwater was investigated by installing 25 monitoring wells and drilling 10 additional test borings for organic vapor analysis. Three of the monitoring wells are screened in deep strata which underlie the black plastic clay. Analysis of water samples collected

from these deep wells in March, 1985 indicates that volatile organic compounds are not present above the Method Detection Limit below the clay aquitard.

The 22 wells installed in the surficial sand aquifer indicate that chemical compounds are present throughout the thickness of the aquifer and are moving in the direction of groundwater flow. Analysis of water samples from Well BP-3, tip 3, for priority pollutants indicates that the compounds present in the groundwater are almost entirely volatile organics. The concentration of any individual volatile organic compound ranges from the Method Detection Limit to 10,328 parts per billion (ppb). The total concentration of volatile organic compounds ranges from the Method Detection Limit to 45,295 ppb. The area where groundwater presently contains volatile organics lies east of the former SCR&D facility and is approximately 2300 feet long and 1000 feet wide. The plume tends to become wider at greater distances from the facility. The data also indicates that the background water quality does not contain volatile organic compounds in concentrations above the Method Detection Limit.

Based on the information obtained during our Remedial Investigation, Golder Associates recommends the following:

1. Conduct a Feasiblity Study to evaluate and select remedial measures for use at this site. Because of the rapid groundwater movement in the surficial aquifer this study should be completed as soon as possible.

REFERENCES

1. U.S. Environmental Protection Agency; Groundwater and Surface Water Investigation, South Carolina REcycling and Disposal, Inc., Bluff Road Site, Columbia, South Carolina, July 1980

2. South Carolina Department of Health and Environmental Control; Investigation of Groundwater at South Carolina Recycling and Disposal Company, Bluff Road Site, Richland County, South Carolina; 1981

3. McNeil, J.D. "Electrical Conductivity of Soils and Rocks," Geonics LTD Technical Note TN-5, 1980

4. Soil & Material Engineers, Inc.; Groundwater Hydrology at Westinghouse Electric Corporation Plant, Richland County, South Carolina; Report No. H8119, 1982

2. Measure the depth to groundwater in each monitoring well monthly to determine seasonal variation in water table.

3. Analyze groundwater samples from Wells BP-1, BP-4, BP-5, P-7, P-8, P-10, P-13, P-14, P-16, P-19, P-20, P-21 and P-22 at least semi-annually for volatile organic compounds.

4. Conduct additional investigations to determine the source and extent of contamination in the vicinity of Wells P-17 and P-18. These investigations may include additional borings, monitoring wells, soil and water sampling, determination of prior land use, or interviews with persons familiar with activities which have occurred in the area. The investigation of the area surrounding Well P-18 is especially important since, at present, there is no reasonable explanation for this contamination.

GOLDER ASSOCIATES

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MTF:JEB:mrs

January 1986

853-3079

TABLE 1

SUMMARY OF
MONITORING WELL DATA

WELL NUMBER	GROUND ELEVATION (ft.- msl)	PVC COLLAR ELEVATION (ft.- msl.)	DEPTH OF SCREEN (ft.)	DEPTH OF OPEN INTERVAL (ft.- msl)
BP 1	138.3	140.09	SEE LOG	8.0 - 50.0
BP 2	137.2	139.18	SEE LOG	5.5 - 49.0
BP 3	137.5	138.33	SEE LOG	8.0 - 49.0
BP 4	134.9	135.90	SEE LOG	7.5 - 45.0
BP 5	137.7	140.20	SEE LOG	8.0 - 48.5
P 6	140.2	143.08	7.1 - 47.6	5.2 - 49.0
P 7	139.9	142.70	4.7 - 45.2	4.0 - 46.5
P 8	138.8	141.25	9.3 - 49.3	6.0 - 51.5
P 9	138.5	141.32	9.3 - 49.8	6.5 - 51.0
P 10	139.2	142.30	7.9 - 48.4	5.5 - 51.5
P 11	137.9	140.87	9.0 - 49.5	7.0 - 51.5
P 12	135.9	139.37	6.0 - 46.5	4.0 - 50.0
P 13	139.6	142.69	8.9 - 49.4	3.0 - 51.5
P 14	138.7	141.67	9.5 - 50.0	6.5 - 51.5
P 15	137.6	140.53	8.1 - 48.6	6.0 - 49.7
P 16	138.5	141.38	10.6 - 51.1	4.5 - 51.1
P 17	134.2	137.39	7.0 - 17.5	5.7 - 19.0
P 18	139.2	141.98	10.0 - 50.0	7.4 - 52.3
P 19	137.6	140.95	4.6 - 44.6	3.5 - 50.5
P 20	137.0	139.95	16.8 - 46.8	10.0 - 50.0
P 21	137.7	141.67	8.0 - 48.0	6.0 - 49.2
P 22	137.8	141.15	14.3 - 48.8	9.5 - 51.5
DH 1	136.9	139.4	90.5 - 109.5	88.0 - 115.0
DH 2	137.3	140.3	72.5 - 91.5	59.0 - 95.0
DH 3	137.4	139.7	98.5 - 117.5	94.0 - 120.0

TABLE 2

SUMMARY OF
VOLATILE ORGANIC ANALYSES ON GROUNDWATER

VOLATILE ORGANIC COMPOUNDS	WELL BP-1 8-SAMPLES 27-Mar-85 (ppb)	WELL BP-1 "1A THRU 1G" 18-Sep-85 (ppb)	WELL BP-2 9-SAMPLES 27-Mar-85 (ppb)	WELL BP-2 "2A THRU 2E" 19-Sep-85 (ppb)	WELL BP-3 4-SAMPLES 25-Apr-85 (ppb)	WELL BP-3 "3A THRU 3D" 18-Sep-85 (ppb)	WELL BP-4 4-SAMPLES 25-Apr-85 (ppb)	WELL BP-4 "4A THRU 4D" 19-Sep-85 (ppb)	WELL BP-5 4-SAMPLES 25-Apr-85 (ppb)	WELL BP-5 "5A THRU 5D" 19-Sep-85 (ppb)
ACROLEIN	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
ACRYLONITRILE	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
BENZENE	20	161	< 1	*	529	*	821	58	105	*
BIS (CHLOROMETHYL) ETHER	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
BROMOFORM	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
CARBON TETRACHLORIDE	< 1	*	< 1	*	1109	*	430	*	40	*
CHLOROBENZENE	< 1	41	< 1	*	29	445	< 1	*	< 1	*
CHLORODI-BROMOMETHANE	< 1	*	< 1	*	< 1	*	< 1	*	3	*
CHLOROETHANE	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
2-CHLOROETHYLVINYL ETHER	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
CHLOROFORM	379	414	3	*	332	*	877	1774	84	*
DICHLOROBROMOMETHANE	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
DICHLORODIFLUOROMETHANE	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
1,1-DICHLOROETHANE	78	880	< 1	*	1	*	< 1	705	< 1	65
1,2-DICHLOROETHANE	278	*	< 1	*	< 1	*	< 1	*	< 1	*
1,1-DICHLOROETHYLENE	129	6827	< 1	*	69	*	107	*	1499	152
1,2-DICHLOROPROPANE	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
1,2-DICHLOROPROPYLENE	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
ETHYLBENZENE	7	149	< 1	*	110	55	411	78	20	*
METHYL BROMIDE	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
METHYL CHLORIDE	< 1	*	< 1	*	< 1	*	1	*	< 1	*
METHYLENE CHLORIDE	3298	10093	1	*	9	*	102	3005	5	*
1,1,2,2-TETRACHLOROETHANE	190	10328	< 1	*	11	1510	387	219	43	*
TETRACHLOROETHYLENE	234	5028	< 1	67	571	823	555	174	146	7
TOLUENE	199	2416	< 1	8	31	495	4	348	250	*
1,2-TRANS-DICHLOROETHYLENE	1596	*	< 1	*	243	*	2	*	326	*
1,1,1-TRICHLOROETHANE	163	4462	< 1	8	4644	1503	7974	3745	4232	20
1,1,2-TRICHLOROETHANE	< 1	*	< 1	*	6	*	22	*	450	11
TRICHLOROETHYLENE	1163	4496	< 1	31	1362	1213	875	86	93	6
TRICHLOROFLUOROBETHANE	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*
VINYL CHLORIDE	< 1	*	< 1	*	< 1	*	< 1	*	< 1	*

*IF PRESENT, LESS THAN 5 ppb.

FIELD MEASUREMENTS										
pH	---	5.8	---	5.9	5.0	6.3	5.0	4.2	5.2	4.8
SPECIFIC CONDUCTIVITY	---	65	---	85	---	80	---	110	---	110

TABLE 2

SUMMARY OF
VOLATILE ORGANIC ANALYSES ON GROUNDWATER
(CONTINUED)

VOLATILE ORGANIC COMPOUNDS	WELL BP-5 3-SAMPLES 10-Dec-85	WELL P-6 16-Sep-85	WELL P-6 03-Dec-85	WELL P-7 16-Sep-85	WELL P-7 05-Dec-85	WELL P-8 16-Sep-85	WELL P-8 04-Dec-85	WELL P-9 17-Sep-85	WELL P-9 05-Dec-85	WELL P-10 17-Sep-85
	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
ACROLEIN	---	*	---	*	---	*	---	*	---	*
ACRYLONITRILE	---	*	---	*	---	*	---	*	---	*
BENZENE	5	*	*	*	*	*	*	*	*	*
BIS (CHLOROMETHYL) ETHER	*	*	*	*	*	*	*	*	*	*
BROMOFORM	*	*	*	*	*	*	*	*	*	*
CARBON TETRACHLORIDE	15	*	*	*	*	*	*	*	*	*
CHLOROBENZENE	*	*	*	*	*	*	*	*	*	*
CHLORODI-BROMOMETHANE	*	*	*	*	*	*	*	*	*	*
CHLOROETHANE	*	*	*	*	*	*	*	*	*	*
2-CHLOROETHYLVINYL ETHER	*	*	*	*	*	*	*	*	*	*
CHLOROFORM	*	*	*	409	93	*	*	115	139	2719
DICHLOROBROMOMETHANE	*	*	*	*	*	*	*	*	*	*
DICHLORODIFLUOROMETHANE	*	*	*	*	*	*	*	*	*	*
1,1-DICHLOROETHANE	231	*	*	*	*	*	*	*	114	2152
1,2-DICHLOROETHANE	91	*	*	*	*	*	*	*	*	*
1,1-DICHLOROETHYLENE	473	*	*	*	*	*	*	136	169	1152
1,2-DICHLOROPROPANE	*	*	*	*	*	*	*	*	*	*
1,2-DICHLOROPROPYLENE	*	*	*	*	*	*	*	*	*	*
ETHYLBENZENE	*	*	*	*	*	*	*	*	*	67
METHYL BROMIDE	*	*	*	*	*	*	*	*	*	*
METHYL CHLORIDE	*	*	*	*	*	*	*	*	*	*
METHYLENE CHLORIDE	7	*	*	*	*	*	*	*	*	1973
1,1,2,2-TETRACHLOROETHANE	*	*	*	*	*	*	*	*	*	902
TETRACHLOROETHYLENE	33	*	*	105	*	5	*	42	27	430
TOLUENE	35	*	*	*	*	*	*	*	9	122
1,2-TRANS-DICHLOROETHYLENE	*	*	*	*	*	*	*	*	*	*
1,1,1-TRICHLOROETHANE	101	*	*	1048	400	*	*	191	87	1654
1,1,2-TRICHLOROETHANE	30	*	*	33	10	*	*	58	42	*
TRICHLOROETHYLENE	18	*	*	591	73	18	*	29	25	679
TRICHLOROFLUOROMETHANE	*	*	*	*	*	*	*	*	*	*
VINYL CHLORIDE	*	*	*	*	*	*	*	*	*	*
FIELD MEASUREMENTS										
pH	6.1	5.4	6.1	5.0	5.3	5.1	5.7	5.2	6.0	5.6
SPECIFIC CONDUCTIVITY	---	76	85	115	90	105	90	130	120	185

*IF PRESENT, LESS THAN 5 ppb.

TABLE 2

SUMMARY OF

VOLATILE ORGANIC ANALYSES ON GROUNDWATER

(CONTINUED)

VOLATILE ORGANIC COMPOUNDS	WELL P-10 05-Dec-85	WELL P-11 16-Sep-85	WELL P-11 03-Dec-85	WELL P-12 16-Sep-85	WELL P-12 04-Dec-85	WELL P-13 17-Sep-85	WELL P-13 05-Dec-85	WELL P-14 17-Sep-85	WELL P-14 06-Dec-85	WELL P-15 17-Sep-85
	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
ACROLEIN	---	*	---	*	---	*	---	*	---	*
ACRYLONITRILE	---	*	---	*	---	*	---	*	---	*
BENZENE	*	*	*	*	*	23	*	*	*	*
BIS (CHLOROMETHYL) ETHER	*	*	*	*	*	*	*	*	*	*
BROMOFORM	*	*	*	*	*	*	*	*	*	*
CARBON TETRACHLORIDE	1280	*	*	*	*	*	*	*	883	*
CHLOROBENZENE	*	*	*	*	*	*	*	*	40	*
CHLORODI-BROMOMETHANE	*	*	*	*	*	*	*	*	*	*
CHLOROETHANE	*	*	*	*	*	*	*	*	*	*
2-CHLOROETHYLVINYL ETHER	*	*	*	*	*	*	*	*	*	*
CHLOROFORM	3425	*	*	*	*	*	2063	*	3776	*
DICHLOROBROMOMETHANE	*	*	*	*	*	1699	*	*	*	*
DICHLORODIFLUOROMETHANE	*	*	*	*	*	*	*	*	*	*
1,1-DICHLOROETHANE	1209	*	*	*	*	1393	491	167	*	*
1,2-DICHLOROETHANE	*	*	*	*	*	*	*	*	*	*
1,1-DICHLOROETHYLENE	119	*	*	*	*	928	326	2216	70	111
1,2-DICHLOROPROPANE	*	*	*	*	*	*	*	*	*	*
1,2-DICHLOROPROPYLENE	*	*	*	*	*	*	*	*	*	*
ETHYLBENZENE	59	*	*	*	*	48	*	*	46	*
METHYL BROMIDE	*	*	*	*	*	*	*	*	*	*
METHYL CHLORIDE	*	*	*	*	*	*	*	*	*	*
METHYLENE CHLORIDE	2008	*	*	*	*	*	*	2986	2921	*
1,1,2,2-TETRACHLOROETHANE	600	*	*	*	*	*	75	636	824	*
TETRACHLOROETHYLENE	241	*	*	60	*	146	95	423	*	43
TOLUENE	94	*	*	*	*	177	13	178	542	*
1,2-TRANS-DICHLOROETHYLENE	*	*	*	*	*	*	*	*	*	*
1,1,1-TRICHLOROETHANE	1863	*	*	*	*	986	1192	2102	7335	49
1,1,2-TRICHLOROETHANE	*	*	*	*	*	*	*	*	34	*
TRICHLOROETHYLENE	469	*	*	*	*	191	148	188	469	*
TRICHLOROFLUOROMETHANE	*	*	*	*	*	*	*	*	*	*
VINYL CHLORIDE	*	*	*	*	*	*	*	*	*	*
FIELD MEASUREMENTS										
pH	6.0	5.5	5.6	5.1	5.2	6.0	5.9	5.6	5.5	5.3
SPECIFIC CONDUCTIVITY	175	120	65	95	75	180	130	270	340	70

*IF PRESENT, LESS THAN 5 ppb.

TABLE 2

SUMMARY OF
VOLATILE ORGANIC ANALYSES ON GROUNDWATER
(CONTINUED)

VOLATILE ORGANIC COMPOUNDS	WELL P-15 05-Dec-85	WELL P-16 17-Sep-85	WELL P-16 05-Dec-85	WELL P-17 19-Nov-85	WELL P-17 26-Nov-85	WELL P-17 04-Dec-85	WELL P-18 04-Dec-85	WELL P-18 21-Dec-85	WELL P-19 06-Dec-85	WELL P-20 04-Dec-85
	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
ACROLEIN	---	*	---	*	---	---	---	---	---	--
ACRYLONITRILE	---	*	---	*	---	---	---	---	---	---
BENZENE	*	348	*	*	5	*	*	*	*	*
BIS (CHLOROMETHYL) ETHER	*	*	*	*	*	*	*	*	*	*
BROMOFORM	*	*	*	*	*	*	*	*	*	*
CARBON TETRACHLORIDE	*	*	*	*	*	*	293	*	*	*
CHLOROBENZENE	*	*	*	*	*	*	*	*	*	*
CHLORODI-BROMOMETHANE	*	*	*	*	*	*	*	*	*	*
CHLOROETHANE	*	*	*	*	*	*	*	*	*	*
2-CHLOROETHYLVINYL ETHER	*	*	*	*	*	*	*	*	*	*
CHLOROFORM	*	*	3797	*	*	27	217	180	*	*
DICHLOROBROMOMETHANE	*	*	*	*	*	*	*	*	*	*
DICHLORODIFLUOROMETHANE	*	*	*	*	*	*	*	*	*	*
1,1-DICHLOROETHANE	*	922	467	*	*	*	*	*	*	*
1,2-DICHLOROETHANE	*	2155	*	*	*	*	*	*	*	*
1,1-DICHLOROETHYLENE	*	4828	926	*	*	*	168	188	*	*
1,2-DICHLOROPROPANE	*	*	*	*	*	*	*	*	*	*
1,2-DICHLOROPROPYLENE	*	*	*	*	*	*	*	*	*	*
ETHYLBENZENE	*	223	*	*	*	*	*	*	*	*
METHYL BROMIDE	*	*	*	*	*	*	*	*	*	*
METHYL CHLORIDE	*	*	*	*	*	*	*	*	*	*
METHYLENE CHLORIDE	*	*	5238	*	*	*	*	*	*	*
1,1,2,2-TETRACHLOROETHANE	*	1825	756	*	*	*	61	91	*	*
TETRACHLOROETHYLENE	23	1993	540	*	*	*	166	115	*	*
TOLUENE	*	1351	357	*	419	*	*	*	*	*
1,2-TRANS-DICHLOROETHYLENE	*	*	*	*	*	*	*	*	*	*
1,1,1-TRICHLOROETHANE	103	5943	3714	*	605	19	456	404	*	*
1,1,2-TRICHLOROETHANE	*	*	*	*	*	*	46	38	*	*
TRICHLOROETHYLENE	11	2130	622	*	60	12	32	31	*	*
TRICHLOROFLUOROMETHANE	*	*	*	*	*	*	*	*	*	*
VINYL CHLORIDE	*	*	*	*	*	*	*	*	*	*

*IF PRESENT, LESS THAN 5 ppb.

FIELD MEASUREMENTS

pH	5.7	6.1	6.0	---	---	5.3	5.4		6.0	6.1
SPECIFIC CONDUCTIVITY	80	480	550	---	---	60	115		375	115

TABLE 2

SUMMARY OF
VOLATILE ORGANIC ANALYSES ON GROUNDWATER
(CONTINUED)

VOLATILE ORGANIC COMPOUNDS	WELL P-21 11-Dec-85	WELL P-22 06-Dec-85	WELL W-8 19-Sep-85	WELL W-9 17-Sep-85	WELL W-10 18-Sep-85	WELL DW-1 27-Mar-85	WELL DW-2 27-Mar-85	WELL DW-3 27-Mar-85
	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
ACROLEIN	*	---	*	*	*	< 1.0	< 1.0	< 1.0
ACRYLONITRILE	*	---	*	*	*	< 1.0	< 1.0	< 1.0
BENZENE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
BIS (CHLOROMETHYL) ETHER	*	*	*	*	*	< 1.0	< 1.0	< 1.0
BROMOFORM	*	*	*	*	*	< 1.0	< 1.0	< 1.0
CARBON TETRACHLORIDE	*	36	*	*	*	< 1.0	< 1.0	< 1.0
CHLOROBENZENE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
CHLORODIBROMOMETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
CHLOROETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
2-CHLOROETHYLVINYL ETHER	*	*	*	*	*	< 1.0	< 1.0	< 1.0
CHLOROFORM	*	*	*	*	*	< 1.0	< 1.0	< 1.0
DICHLOROBROMOMETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
DICHLORODIFLUOROMETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
1,1-DICHLOROETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
1,2-DICHLOROETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
1,1-DICHLOROETHYLENE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
1,2-DICHLOROPROPANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
1,2-DICHLOROPROPYLENE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
ETHYLBENZENE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
METHYL BROMIDE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
METHYL CHLORIDE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
METHYLENE CHLORIDE	*	249	*	*	*	< 1.0	< 1.0	< 1.0
1,1,2,2-TETRACHLOROETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
TETRACHLOROETHYLENE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
TOLUENE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
1,2-TRANS-DICHLOROETHYLENE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
1,1,1-TRICHLOROETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
1,1,2-TRICHLOROETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
TRICHLOROETHYLENE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
TRICHLOROFLUOROMETHANE	*	*	*	*	*	< 1.0	< 1.0	< 1.0
VINYL CHLORIDE	*	*	*	*	*	< 1.0	< 1.0	< 1.0

*IF PRESENT, LESS THAN 5 ppb.

FIELD MEASUREMENTS

pH	6.2	5.9	5.2	5.2	5.7	5.0	3.5	6.3
SPECIFIC CONDUCTIVITY	---	60	195	45	385	---	---	---

TABLE 2

SUMMARY OF
VOLATILE ORGANIC ANALYSES ON GROUNDWATER
(CONTINUED)

VOLATILE ORGANIC COMPOUNDS	MYERS CREEK "MYERS CREEK" 27-Mar-85	MYERS CREEK "50A - 50B" 19-Sep-85
	(ppb)	(ppb)
ACROLEIN	< 1.0	*
ACRYLONITRILE	< 1.0	*
BENZENE	< 1.0	*
BIS (CHLOROETHYL) ETHER	< 1.0	*
BROMOFORM	< 1.0	*
CARBON TETRACHLORIDE	< 1.0	*
CHLOROBENZENE	< 1.0	*
CHLORODI-BROMOMETHANE	< 1.0	*
CHLOROETHANE	< 1.0	*
2-CHLOROETHYLVINYL ETHER	< 1.0	*
CHLOROFORM	< 1.0	*
DICHLOROBROMOMETHANE	< 1.0	*
DICHLORODIFLUOROMETHANE	< 1.0	*
1,1-DICHLOROETHANE	< 1.0	*
1,2-DICHLOROETHANE	< 1.0	*
1,1-DICHLOROETHYLENE	< 1.0	*
1,2-DICHLOROPROPANE	< 1.0	*
1,2-DICHLOROPROPYLENE	< 1.0	*
ETHYLBENZENE	< 1.0	*
METHYL BROMIDE	< 1.0	*
METHYL CHLORIDE	< 1.0	*
METHYLENE CHLORIDE	< 1.0	*
1,1,2,2-TETRACHLOROETHANE	< 1.0	*
TETRACHLOROETHYLENE	< 1.0	*
TOLUENE	< 1.0	*
1,2-TRANS-DICHLOROETHYLENE	< 1.0	*
1,1,1-TRICHLOROETHANE	< 1.0	*
1,1,2-TRICHLOROETHANE	< 1.0	*
TRICHLOROETHYLENE	< 1.0	*
TRICHLOROFLUOROMETHANE	< 1.0	*
VINYL CHLORIDE	< 1.0	*

*IF PRESENT, LESS THAN 5 ppb.

FIELD MEASUREMENTS		
pH	5.6	4.8
SPECIFIC CONDUCTIVITY	---	70

TABLE 3

SUMMARY OF
HYDRAULIC CONDUCTIVITY VALUES

Well No.	Sample	Depth (ft.)	Hydraulic Conductivity (cm/sec)	Method of Analysis
BP-1	Sa-8	18.5-20.0	6.8×10^{-2}	Hazen
BP-1	Sa-11	33.5-35.0	22.0×10^{-2}	Hazen
BP-1	-	45.0-47.5	3.2×10^{-2}	Pump Test
BP-2	Sa-11	38.5-40.0	3.6×10^{-2}	Hazen
BP-2	-	45.0-47.5	3.1×10^{-2}	Pump Test
BP-3	Sa-11	28.5-30.0	18.0×10^{-2}	Hazen
BP-4	Sa-10	33.5-35.0	6.3×10^{-2}	Hazen
BP-4-1	-	38.7-43.7	3.2×10^{-2}	Pump Test
BP-5	Sa-7	18.5-20.0	4.0×10^{-2}	Hazen
BP-5-1	-	40.0-47.5	3.1×10^{-2}	Pump Test
P-7	-	4.7-45.2	7.0×10^{-2}	Pump Test
P-8	-	9.3-50.0	3.5×10^{-2}	Pump Test
P-9	-	9.3-49.8	3.4×10^{-2}	Pump Test
P-13	Sa-9	45.0-46.5	13.0×10^{-2}	Hazen
P-13	-	8.9-50.0	2.5×10^{-2}	Pump Test
P-14	Sa-5	25.0-26.5	9.6×10^{-2}	Hazen
P-15	Sa-4	40.0-41.5	18.0×10^{-2}	Hazen
P-15	-	8.1-48.6	3.2×10^{-2}	Pump Test
W-6	-	9.5-12.0	3.2×10^{-2}	Pump Test
W-7	-	9.5-12.0	2.4×10^{-2}	Pump Test
W-8	-	9.5-12.0	3.2×10^{-2}	Pump Test
W-10	-	12.0-15.0	4.6×10^{-2}	Pump Test
W-11	-	9.5-12.0	3.0×10^{-2}	Pump Test

TABLE 4

SUMMARY OF SOIL PHYSICAL TEST RESULTS

BORING NO.	SAMPLE NO.	SAMPLE DEPTH (FEET)	WATER CONTENT (PERCENT)	LIQUID LIMIT (PERCENT)	PLASTIC LIMIT (PERCENT)	PERCENT PASSING #200	D_{10} (mm)	SPECIFIC GRAVITY	LABORATORY PERMEABILITY (cm/sec)
BP-1	8	18.5-20.0	20.2			0.9	0.260		
BP-1	11	33.5-35.0				1.1	0.470		
BP-2	4	8.5-10.0	21.8			19.2	<0.001		
BP-2	10	33.5-35.0	19.1			13.9			
BP-2	11	38.5-40.0				7.7	0.190		
BP-3	11	28.5-30.0	12.9			1.0	0.430		
BP-4	10	33.5-35.0	17.1			1.0	0.250		
BP-4	12	43.5-45.0	18.6	60	35	83.4	<0.001		
BP-5	7	18.5-20.0	21.3			2.2	0.200		
BP-5	11	38.5-40.0	19.9						
P-8	9	45.0-46.5				20.9	0.041		
P-13	3	15.0-16.5				14.2	0.040		
P-13	9	45.0-46.5				0.9	0.360		
P-14	5	25.0-26.5				1.8	0.310		
P-16	3	49.5-50.9	26.1	60	31	100.0	<0.001	2.59	9.4×10^{-9}
P-22	4	18.5-20.0				48.0	<0.001		
P-22	5	28.5-30.0				16.9	<0.001		
DW-1	7	103.0-104.5	18.3			18.3	0.003		
DW-2	7	84.0-85.0	24.0			34.0	<0.001		
DW-3	1	58.0-60.0	29.0	26	17	94.7	<0.001	2.62	8.6×10^{-8}
DW-3	4	110.0-110.5				2.1	0.420		
T-6	4	40.0-41.5				0.6	0.420		

January 1986

TABLE 5

SUMMARY OF PIEZOMETRIC DATA

WELL NO.	PVC CASING ELEVATION (FT-MSL)	GROUND ELEVATION (FT-MSL)	DEPTH OF OPEN INTERVAL (FT)	DEPTH TO GROUNDWATER FROM TOP OF PVC CASING (FT)									
				14-Dec-84	24-Jan-85	13-Feb-85	22-Feb-85	27-Feb-85	14-Mar-85	15-Mar-85	20-Mar-85	27-Mar-85	28-Mar-85
W-1	142.75	140.6	17.0-22.0	13.07	13.34							10.82	
W-6	135.83	135.3	9.5-12.0	7.10	7.20							5.40	
W-7	135.95	135.5	9.5-12.0	7.23	7.29							5.63	
W-8	136.31	135.7	9.5-12.0	7.58	7.60							5.84	
W-9	135.61	135.1	9.5-12.0	6.13	6.33							4.08	
W-10	136.45	135.5	12.0-15.0	7.13	7.37							5.10	
W-11	135.39	135.0	9.5-12.0	6.88	6.85							4.95	
BP-1 BLUE-ORG	140.06	138.2											
BP-1 BLUE-YLW	140.06	138.2	10.0		11.05	11.50				8.65			
BP-1 BLACK	140.06	138.2	14.0		11.05	11.60				8.55			
BP-1 RED	140.06	138.2	19.0		11.10	11.50				8.60			
BP-1 BROWN	140.06	138.2	24.0		11.10	11.50				8.60			
BP-1 YELLOW	140.06	138.2	29.0		11.10	11.60				8.60			
BP-1 GREEN	140.06	138.2	34.0		11.30	11.70				8.75			
BP-1 BLUE	140.06	138.2	39.0		11.45	11.80				8.80			
BP-1 ORANGE	140.06	138.2	44.0		10.35	11.80				8.80			
BP-1 SCREEN	140.06	138.2	46.5		11.60	11.80				9.00			
BP-2 BLUE-YLW	139.13	137.1	7.5				11.40	8.90	9.15	9.15	9.15		
BP-2 BLACK	139.13	137.1	12.5				11.40	8.90	9.05	9.05	9.10		
BP-2 RED	139.13	137.1	17.5				11.35	8.90	9.05	9.05	9.10		
BP-2 BROWN	139.13	137.1	22.5				11.30	8.90	8.20	9.10	9.10		
BP-2 YELLOW	139.13	137.1	27.5				11.30	8.87	9.05	9.05	9.10		
BP-2 GREEN	139.13	137.1	32.5				11.25	8.85	9.10	9.05	9.10		
BP-2 BLUE	139.13	137.1	37.5				11.25	8.85	9.15	9.05	9.10		
BP-2 ORANGE	139.13	137.1	42.5				11.20	8.85	9.00	9.10	9.10		
BP-2 SCREEN	139.13	137.1	45.0										
BP-3-4	138.50	137.5	10.2-17.7										
BP-3-3	138.50	137.5	18.7-28.7										
BP-3-2	138.50	137.5	33.9-38.9										
BP-3-1	138.50	137.5	43.3-49.3										
BP-4-4	136.00	135.0	10.0-15.0										
BP-4-3	136.00	135.0	16.5-21.5										
BP-4-2	136.00	135.0	27.5-37.5										
BP-4-1	136.00	135.0	38.7-43.7										
BP-5-4	140.20	137.7	10.0-15.0										
BP-5-3	140.20	137.7	17.5-22.5										
BP-5-2	140.20	137.7	27.6-35.1										
BP-5-1	140.20	137.7	40.0-47.5										

3 10 00093

TABLE 5

SUMMARY OF PIEZOMETRIC DATA
(CONTINUED)

WELL NO.	PVC CASING ELEVATION (FT-MSL)	GROUND ELEVATION (FT-MSL)	DEPTH OF OPEN INTERVAL (FT)	DEPTH TO GROUNDWATER FROM TOP OF PVC CASING (FT)									
				14-Dec-84	24-Jan-85	13-Feb-85	22-Feb-85	27-Feb-85	14-Mar-85	15-Mar-85	20-Mar-85	27-Mar-85	28-Mar-85
P-6	143.08	140.2	5.2 - 49.0										
P-7	142.70	139.9	4.0 - 46.5										
P-8	141.25	138.7	6.0 - 51.5										
P-9	141.32	138.5	6.5 - 51.0										
P-10	142.30	139.2	5.5 - 51.5										
P-11	140.87	137.9	7.0 - 51.5										
P-12	139.37	135.9	4.0 - 50.0										
P-13	142.69	139.6	3.0 - 51.5										
P-14	141.67	138.7	6.5 - 51.5										
P-15	140.53	137.6	6.0 - 49.7										
P-16	141.38	138.5	4.5 - 51.1										
P-17	137.39	134.2	5.7 - 19.0										
P-18	141.98	139.2	7.4 - 52.3										
P-19	140.95	137.6	6.0 - 49.7										
P-20	139.95	137.0	10.0 -50.0										
P-21	141.67	137.7	6.0 - 49.2										
P-22	141.15	137.8	9.5 - 51.5										
DW-1	139.39	136.3	89.0-115.0										14.55
DW-2	140.41	137.3	59.0-95.0									14.65	
DW-3	139.90	137.4	94.0-117.5										15.08

TABLE 5

853-3079

SUMMARY OF PIEZOMETRIC DATA
(CONTINUED)

DEPTH TO GROUNDWATER FROM TOP OF PVC CASING (FT)

WELL NO.	PVC CASING ELEVATION (FT-MSL)	29-Mar-85	10-Apr-85	24-Apr-85	25-Apr-85	26-Apr-85	18-Sep-85	06-Dec-85	13-Dec-85	20-Dec-85
W-1	142.75	10.80	11.10			11.47	11.55		8.97	
W-6	135.83	5.40	5.48			5.77	6.10			4.83
W-7	135.95	5.63	5.72			5.92	6.30			4.60
W-8	136.31	5.84	5.96			6.24	6.55		4.67	4.91
W-9	135.61	4.08	4.24			4.60	4.60			2.82
W-10	136.45	5.10	5.22			5.61	5.70		3.52	3.70
W-11	135.39	4.95	5.04			5.43	5.80		3.72	3.85
BP-1 BLUE-ORG	140.06									
BP-1 BLUE-YLW	140.06	8.70	8.85			9.35				
BP-1 BLACK	140.06	8.70	8.88			9.25				
BP-1 RED	140.06	8.70	8.87			9.25				
BP-1 BROWN	140.06	8.60	8.87			9.25				
BP-1 YELLOW	140.06	8.80	8.88			9.30				
BP-1 GREEN	140.06	9.00	8.99							
BP-1 BLUE	140.06	9.00	9.19			9.55				
BP-1 ORANGE	140.06									
BP-1 SCREEN	140.06	9.00	9.24			9.65	9.30		7.61	7.79
BP-2 BLUE-YLW	139.13		8.43							
BP-2 BLACK	139.13	9.10	9.14			9.40				
BP-2 RED	139.13	9.10	9.12			9.38				
BP-2 BROWN	139.13	9.10	9.11			9.35				
BP-2 YELLOW	139.13	9.10	9.11			9.37				
BP-2 GREEN	139.13	9.10	9.11			9.40				
BP-2 BLUE	139.13	9.10	9.09			9.42				
BP-2 ORANGE	139.13	9.10	9.25			9.40				
BP-2 SCREEN	139.13	9.05	9.11			9.40	9.70			8.03
BP-3-4	138.50					7.59	7.45			
BP-3-3	138.50				7.52	7.63	7.50			
BP-3-2	138.50				7.93	7.96	7.90			
BP-3-1	138.50			7.48	7.97	8.02	7.90		5.86	6.06
BP-4-4	136.00					5.46	5.60			
BP-4-3	136.00					5.54	5.70			
BP-4-2	136.00					5.55	5.70			
BP-4-1	136.00					5.60	5.75		3.77	3.90
BP-5-4	140.20					10.71	11.00	9.71		
BP-5-3	140.20				10.62	10.68	11.00	9.72		
BP-5-2	140.20				10.60	10.70	11.00	9.68		
BP-5-1	140.20				10.65	10.70	11.00		9.31	9.48

3 10 00095

TABLE 5
SUMMARY OF PIEZOMETRIC DATA
(CONTINUED)

WELL NO.	PVC CASING ELEVATION (FT-MSL)	DEPTH TO GROUNDWATER FROM TOP OF PVC CASING (FT) 29-Mar-85	10-Apr-85	24-Apr-85	25-Apr-85	26-Apr-85	18-Sep-85	06-Dec-85	13-Dec-85	20-Dec-85
P-6	143.08						11.65	9.10	9.26	9.58
P-7	142.76						11.50	9.07	9.23	9.48
P-8	141.25						12.15	11.32	10.63	10.78
P-9	141.32						12.20	11.01	10.58	10.73
P-10	142.10						13.40	12.18		12.30
P-11	140.97						12.00	11.22		10.76
P-12	139.37						10.05	8.89		8.73
P-13	142.69						13.60	12.30	12.05	12.20
P-14	141.67						13.35	12.24		12.12
P-15	140.53						11.35	10.14	9.72	9.88
P-16	141.38						12.55	11.23		11.41
P-17	137.39							6.57		6.43
P-18	141.98							12.50		12.05
P-19	140.95							12.05		11.97
P-20	139.95							11.20		10.95
P-21	141.67							12.26		12.07
P-22	141.15							11.86		11.72
DW-1	139.39	14.55	14.64			14.94				
DW-2	140.41	14.65	14.76			15.03				
DW-3	139.90	15.08	15.14			15.37				

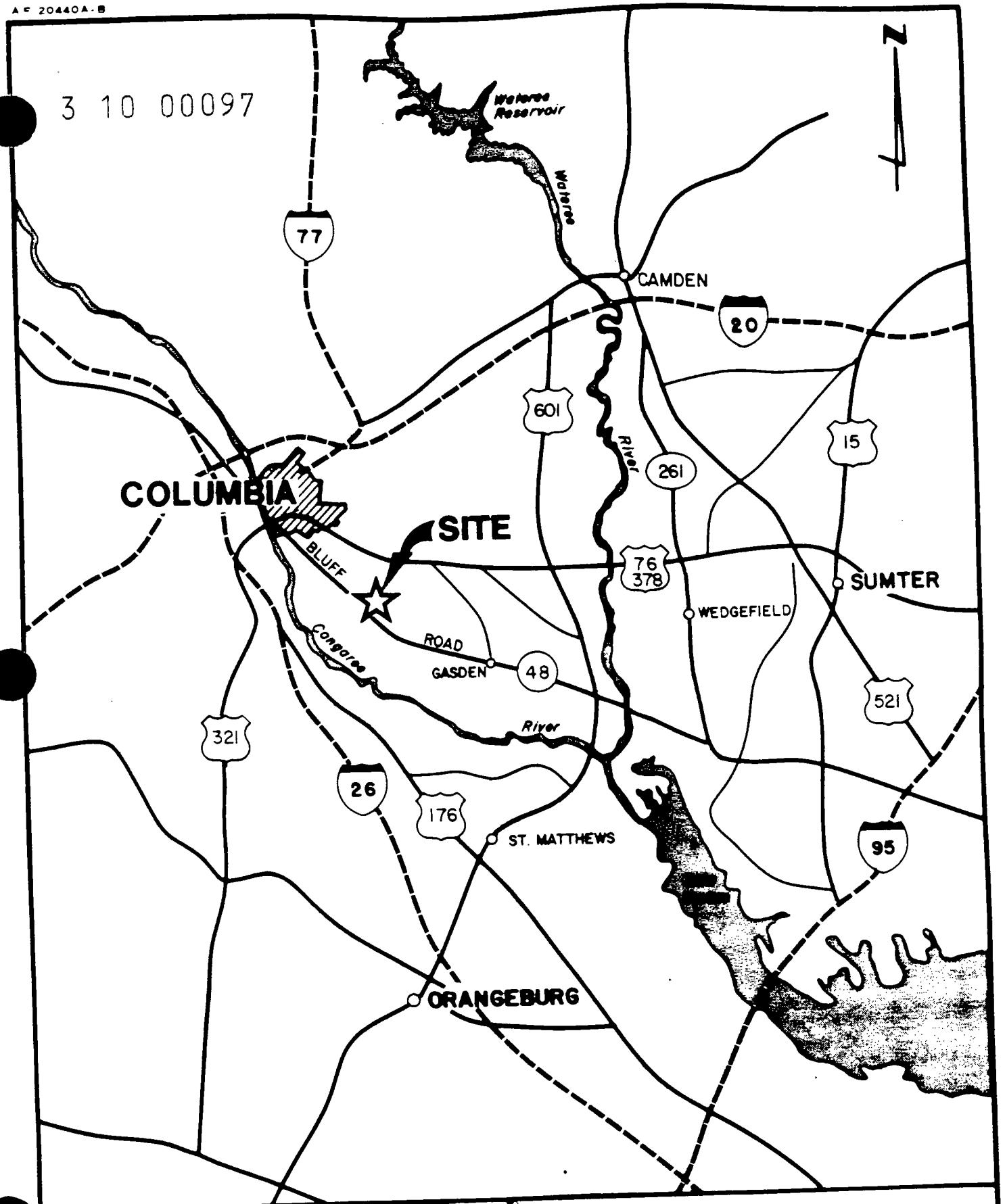
SEE REMARKS BELOW

*REMARKS:

1-24-85: BP1 - ATTEMPTED TO PUMP APPROXIMATELY 24 HOURS EARLIER
2-27-85: BP2 - PUMPED DRANGE APPROXIMATELY 45 MINUTES. WATER LEVEL AT 8.6 FT AFTER PUMPING
3-14-85: BP2 - WATER LEVELS BEFORE AIRLIFT
3-15-85: BP1 - APPROXIMATELY 30 MINUTES AFTER PUMPING CORE
BP2 - WATER LEVELS 24 HOURS AFTER AIR LIFTING
3-29-85: BP1 - ORANGE TIP APPARENTLY BLINDED BY DEVELOPEMENT

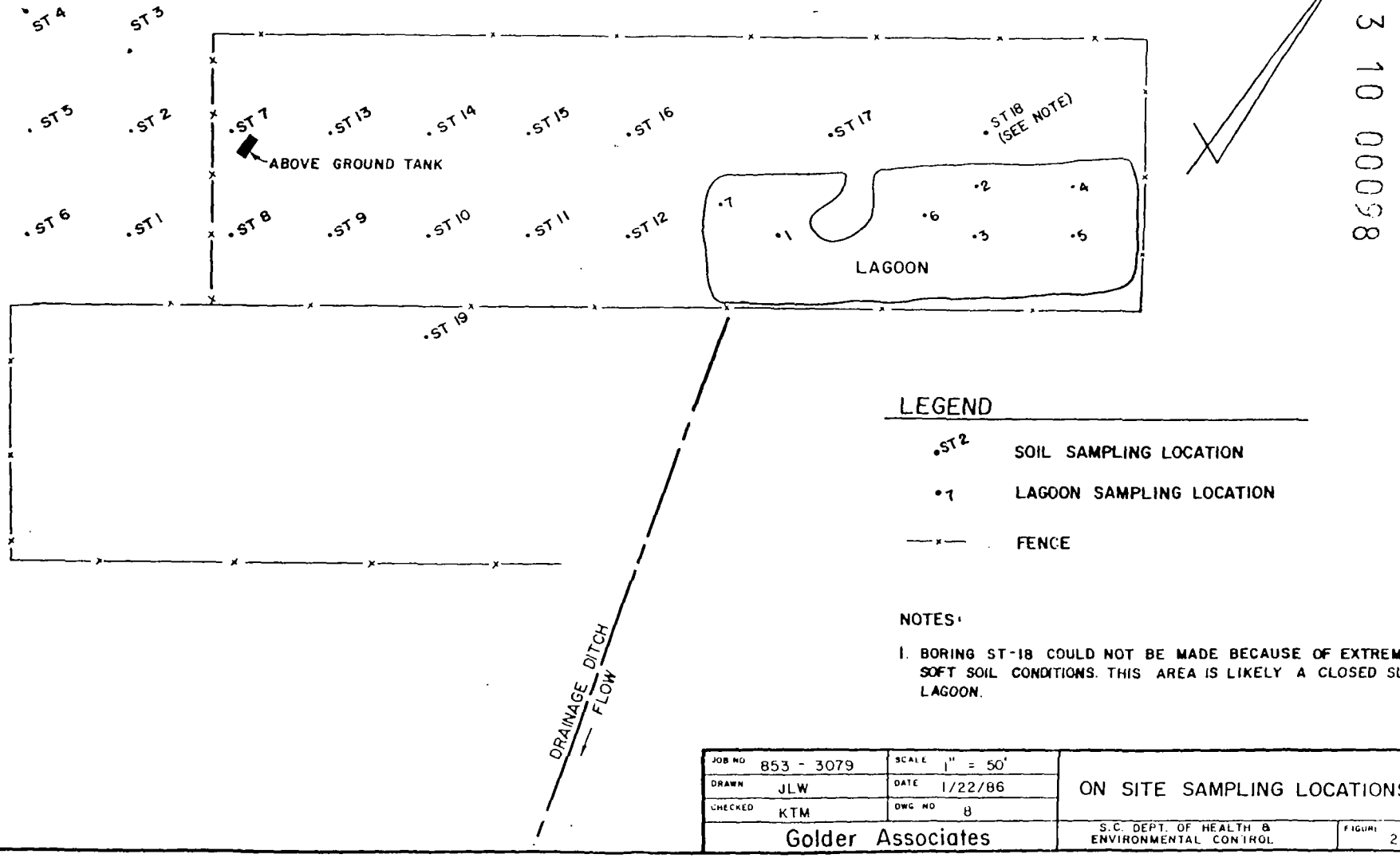
AF 2044OA-B

3 10 00097



JOB NO. 853-3079	SCALE N.T.S	SITE LOCATION MAP
DRAWN T.s R.	DATE 1/22/86	
CHECKED MTF	DWG. NO. 15	
Golder Associates	SCDHEC / BLUFF RD. / S.C.	FIGURE 1

FIGURE 2



LEGEND

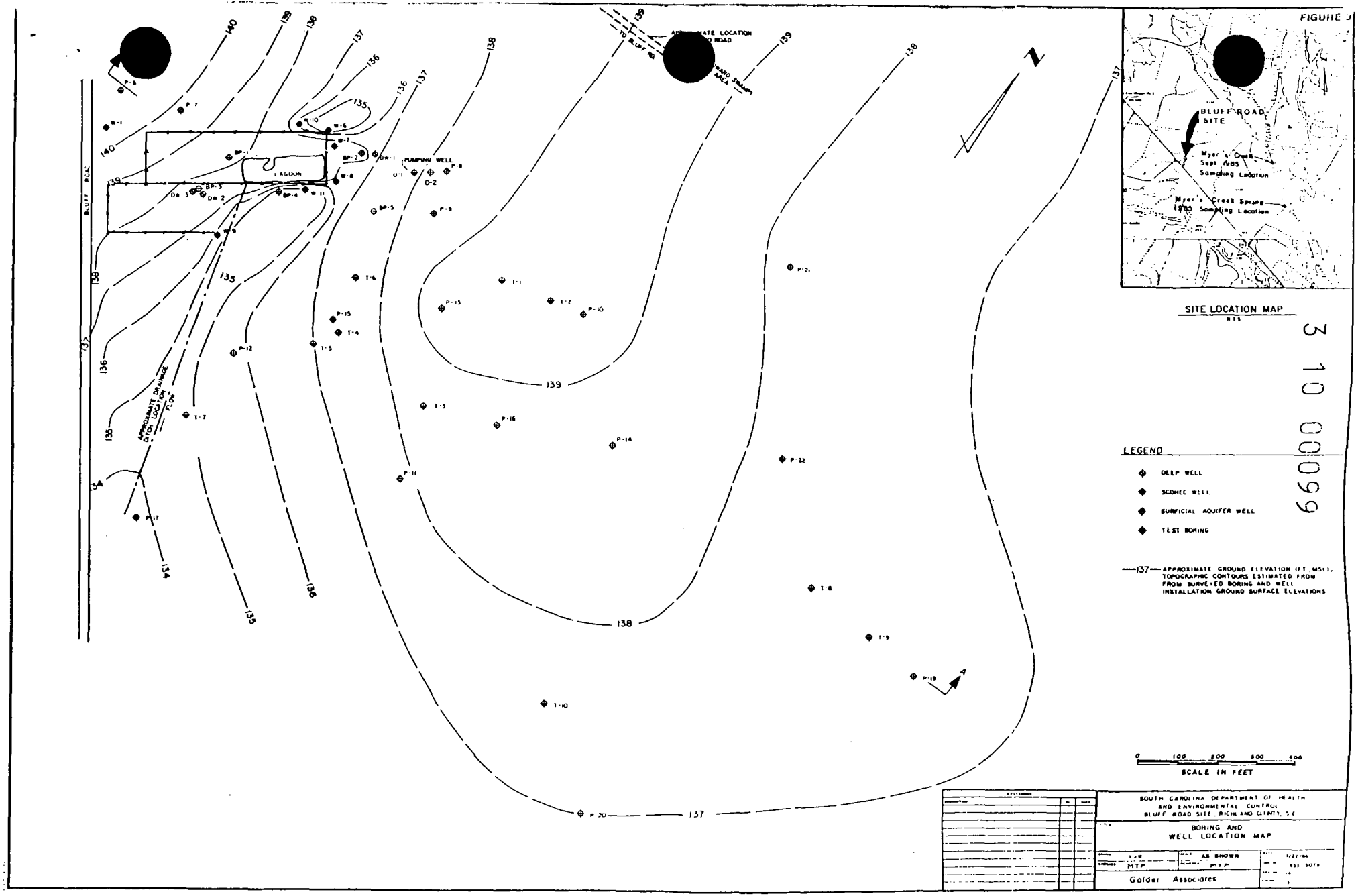
- •ST2 — SOIL SAMPLING LOCATION
- •1 — LAGOON SAMPLING LOCATION
- —x— FENCE

NOTES:

1. BORING ST-18 COULD NOT BE MADE BECAUSE OF EXTREMELY SOFT SOIL CONDITIONS. THIS AREA IS LIKELY A CLOSED SLUDGE LAGOON.

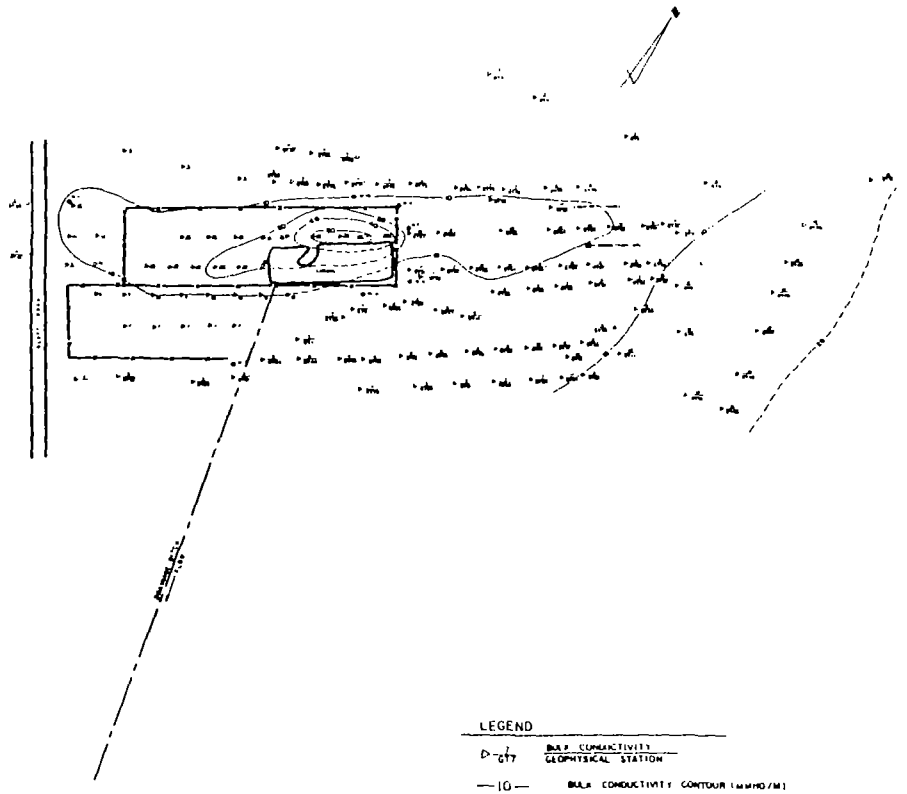
JOB NO 853 - 3079	SCALE 1" = 50'	ON SITE SAMPLING LOCATIONS
DRAWN JLW	DATE 1/22/86	
CHECKED KTM	DWG NO 8	
Golder Associates	S.C. DEPT. OF HEALTH & ENVIRONMENTAL CONTROL	FIGURE 2

FIGURE 3



3 10 00069

3 10 00100



LEGEND

D-GT7 — BULK CONDUCTIVITY GEOPHYSICAL STATION

—10— BULK CONDUCTIVITY CONTOUR (MMHO/M)

● M-7 SCDHEC WELL

——·—— FENCE LINE

0 100 200 300 400

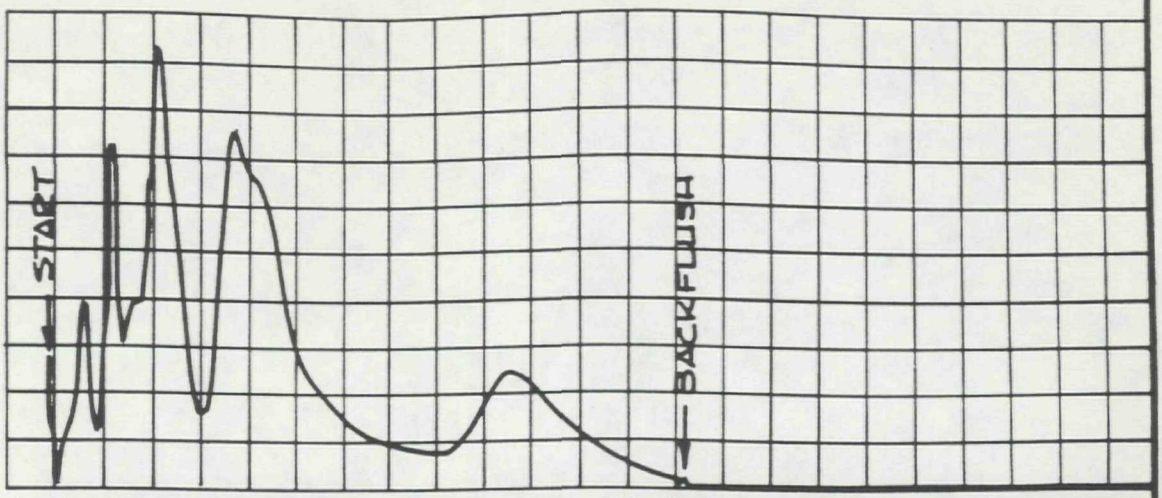
SCALE IN FEET

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BLUFF ROAD SITE, RICHLAND COUNTY, SC

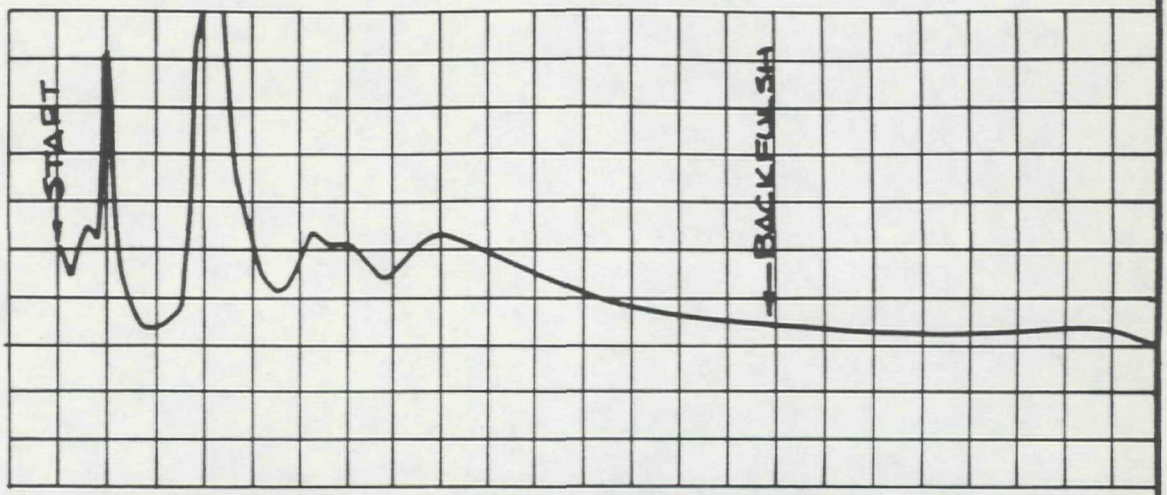
GEOPHYSICAL DATA AND CONTOURS

Golder Associates

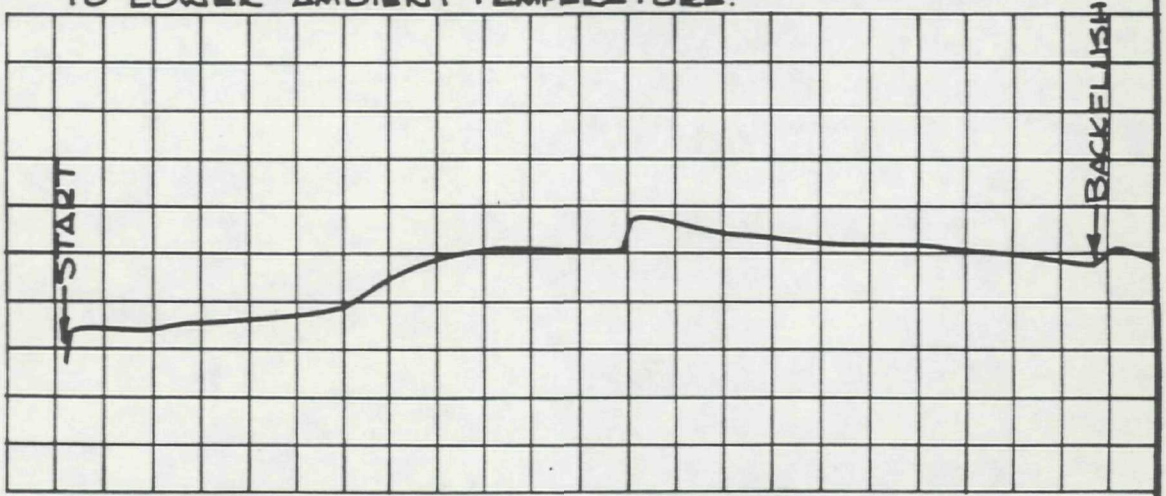
AF 20440A-B 3 10 00101



1. CHROMATOGRAM FROM JAR SAMPLE OF CONTAMINATED GROUNDWATER.



2. CHROMATOGRAM OF SOIL GAS SHOWING CONTAMINANT SIGNATURE. NOTE SLIGHTLY LONGER ELUTION TIME DUE TO LOWER AMBIENT TEMPERATURE.

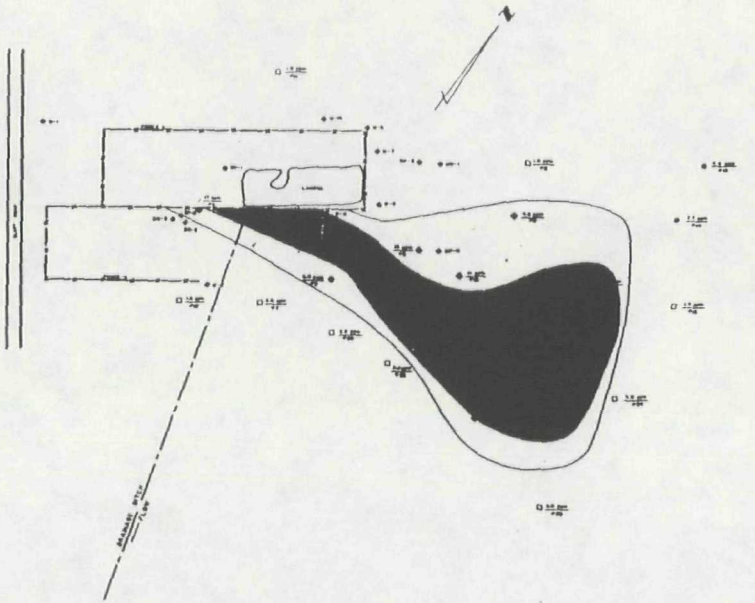


3. CHROMATOGRAM OF SOIL GAS SHOWING "BACKGROUND" SOIL GAS SIGNATURE.

JOB NO. 863-3079	SCALE AS SHOWN	TYPICAL CHROMATOGRAMS OF SOIL GASES
DRAWN SKB	DATE 1-22-86	
CHECKED MTF	DWG. NO. 12	
Golder Associates	S.C. DEPT. OF HEALTH & ENVIRONMENTAL CONTROL	FIGURE 5

FIGURE

3 10 00102



LEGEND

- 28 ppm / • 7 — SOIL GAS READING / SOIL GAS TEST STATION
- NO CHROMATOGRAPH SCAN
- CHROMATOGRAPH SCAN GIVES CONTAMINATE SIGNATURE
- CHROMATOGRAPH SCAN DOES NOT GIVE CONTAMINATE SIGNATURE
- SCDHEC WELL
- SURFICIAL AQUIFER WELL
- DEEP WELL
- SOIL GAS READING LESS THAN 25 ppm
- SOIL GAS READING MORE THAN 25 ppm

0 100 200 300 400

SCALE IN FEET

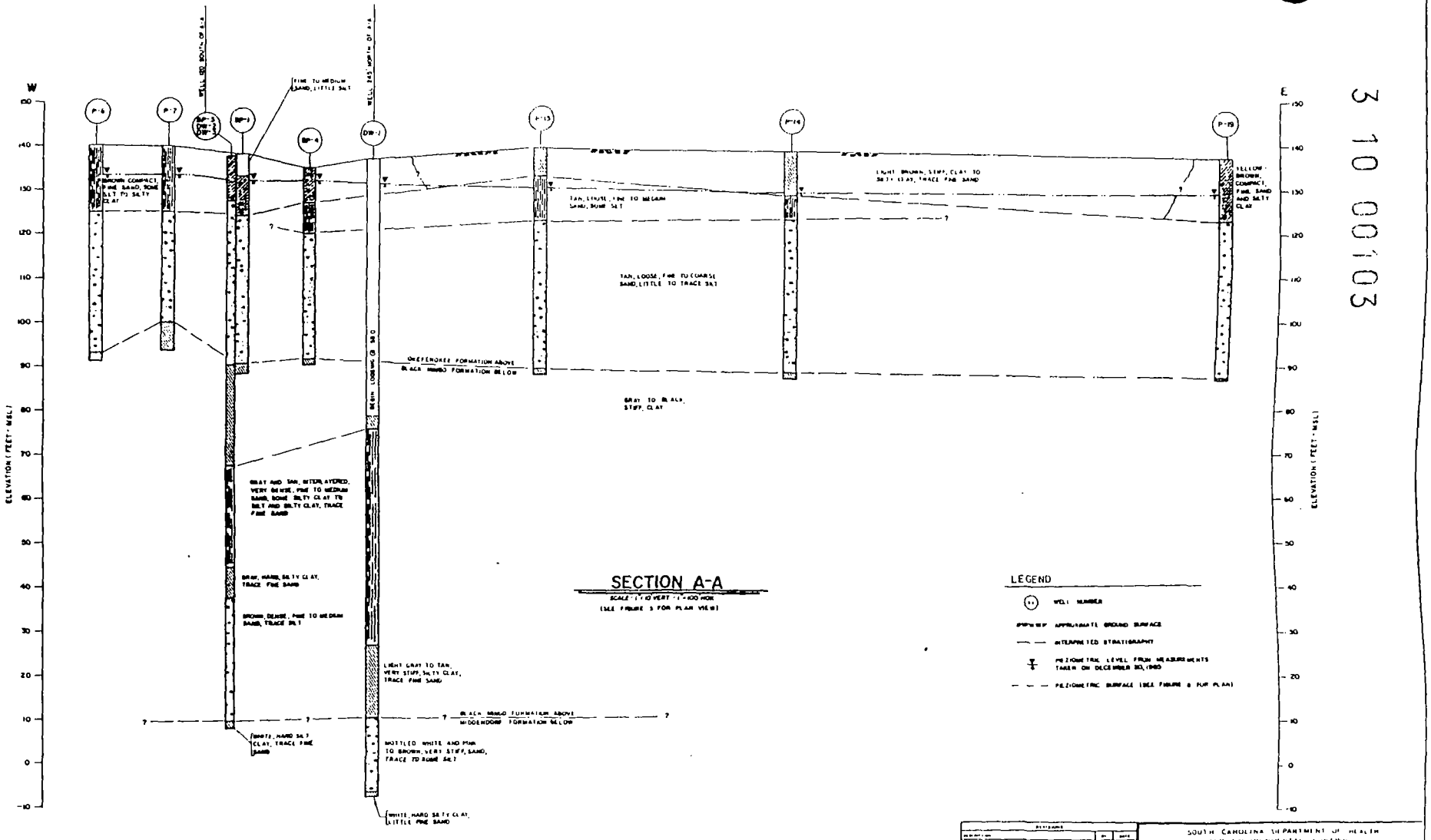
SOUTH CAROLINA DEPARTMENT OF HEALTH, AND ENVIRONMENTAL CONTROL
BLUFF ROAD SITE, RICHLAND COUNTY, S.C.

SOIL GAS SURVEY RESULTS

DRAWN BKB	SCALE AS SHOWN	DATE	1/22/86
CHECKED MTC	APPROVED JEB	JOB NO	853-5079
Golder Associates		DWG NO	11
		REV	0

FIGURE 7

3 10 00103



SECTION A-A

SCALE: 1" = 10' VERT. / 1" = 100' HOR.

(SEE FIGURE 5 FOR PLAN VIEW)

LEGEND

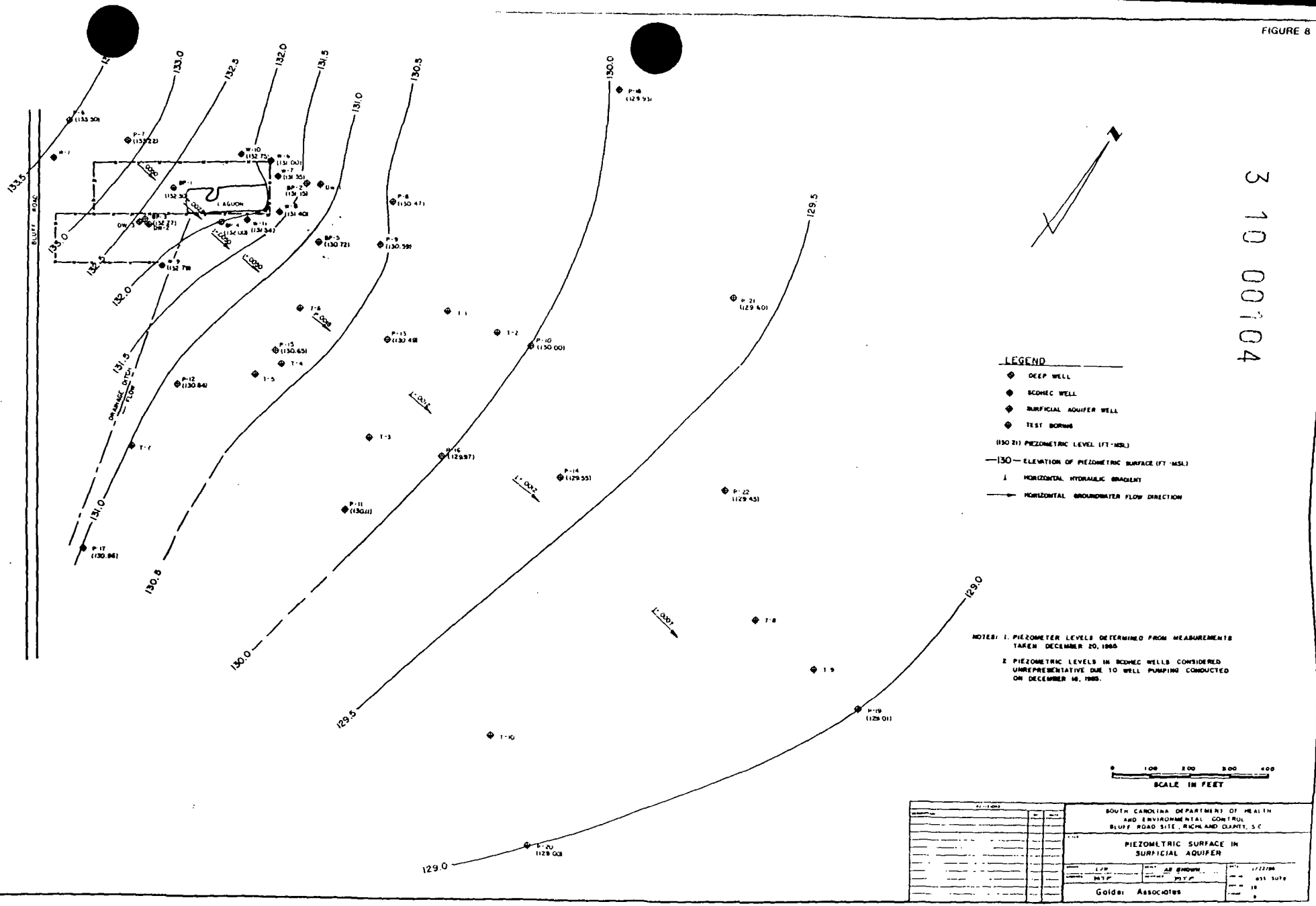
- (P-1) WELL NUMBER
- APPROXIMATE GROUND SURFACE
- INTERPRETED STRATIGRAPHY
- PIEZOMETRIC LEVEL FROM MEASUREMENTS TAKEN ON DECEMBER 30, 1980
- PIEZOMETRIC SURFACE (SEE FIGURE 8 FOR PLAN)

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BLUFF ROAD SITE, RICHLAND COUNTY, S.C.

GEOLOGIC CROSS SECTION A-A

Golder Associates

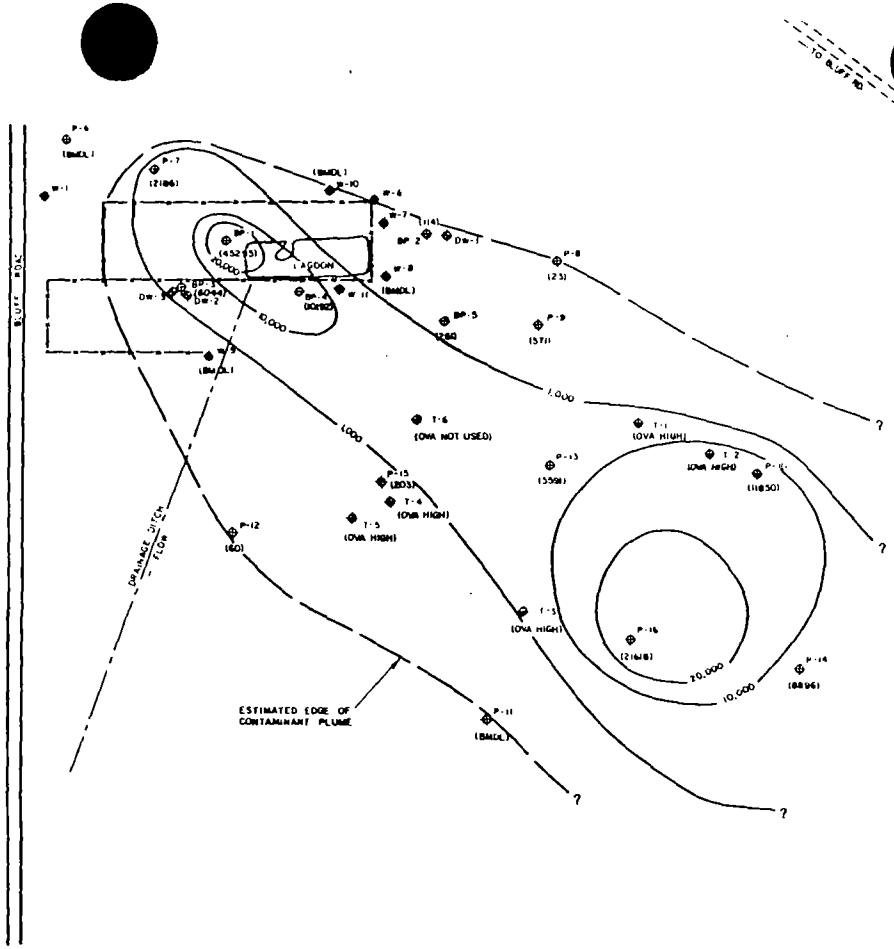
FIGURE 8



3 10 00104

FIGURE

3 10 00105



LEGEND

- DEEP WELL
- SCDHEC WELL
- SURFICIAL AQUIFER WELL
- TEST BORING
- P-12 (60) TOTAL CONCENTRATION OF VOLATILE ORGANICS (ppb) SEPTEMBER 1985 SAMPLING
- —10,000— ESTIMATED CONCENTRATION CONTOUR (ppb)
- (BMDL) BELOW METHOD DETECTION LIMIT
- (OVA HIGH) HIGH OVA READING ON SOIL SAMPLE

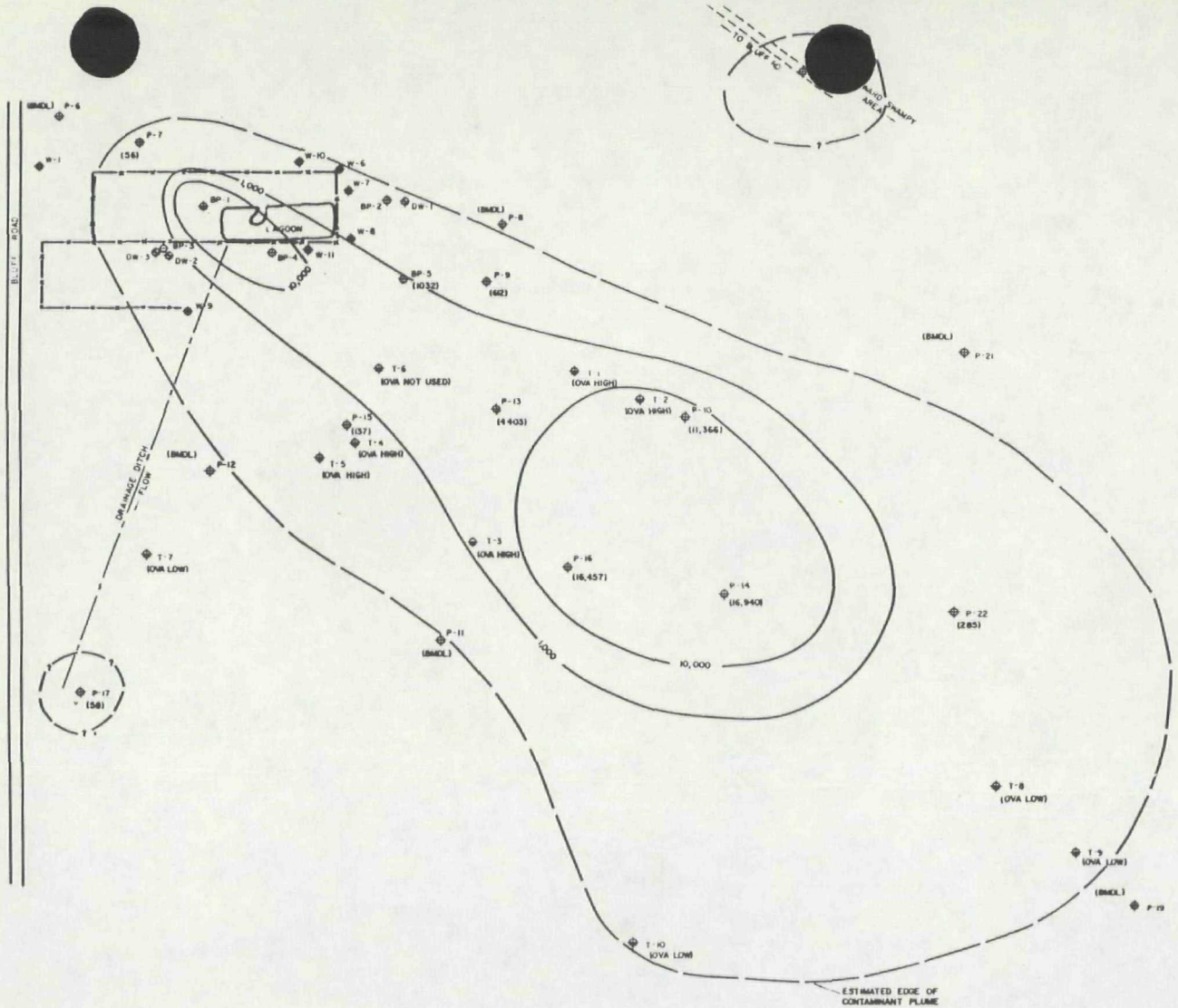
0 100 200 300 400
SCALE IN FEET

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BLUFF ROAD SITE, RICHLAND COUNTY, S.C.

EXTENT OF SURFICIAL AQUIFER GROUNDWATER CONTAMINATION SEPTEMBER 1985

Golder Associates

FIGURE 10



3 10 00106

LEGEND

- DEEP WELL
- BCDHEC WELL
- BURFICIAL AQUIFER WELL
- TEST BORING
- P-17 (58) TOTAL CONCENTRATION OF VOLATILE ORGANICS (ppb) DECEMBER 1985 SAMPLING
- (BMDL) INDICATES RESULT BELOW METHOD DETECTION LIMIT
- —10,000— ESTIMATED CONCENTRATION CONTOUR (ppb)
- (OVA HIGH) HIGH OVA READING ON SOIL SAMPLE
- (OVA LOW) LOW OVA READING ON SOIL SAMPLE

0 100 200 300 400
SCALE IN FEET

REVISIONS	BY	DATE

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BLUFF ROAD SITE, RICHLAND COUNTY, S.C.

EXTENT OF SURFICIAL AQUIFER GROUNDWATER CONTAMINATION DECEMBER 1985

DRAWN LJW	SCALE AS SHOWN	DATE 1/23/86
CHECKED MTP	APPROVED MTP	JOB NO 833 3079
		DWG NO 17
		REV

Golder Associates

APPENDIX A

Boring Logs

Appendix A-1

Shallow On-site Borings

3 10 00109

BORING LOG ST1

SHEET 1 OF 1

ACE ELEV. 140.4 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-22-85 DATE COMPLETED 1-22-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Loose gray to red-brown fine to medium SAND , some silt.	SM						Organic Vapor Rdg.
					1	DO	--	--	20 ppm
					2	DO	--	--	10 ppm
4.5		Bottom of hole 4.5 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00110

BORING LOG ST2

SHEET 1 OF 1

SURFACE ELEV. 140.8 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-22-85 DATE COMPLETED 1-22-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		SAND & GRAVEL-FILL							Organic Vapor Rdg.
1.0		Orange-brown loose fine to medium SAND, some silt.	SM		1	DO	--	--	5 ppm
					2	DO	--	--	3 ppm
					3	DO	--	--	5 ppm
5.5		Bottom of hole 5.5 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00111

BORING LOG ST 3

SHEET 1 OF 1

SURFACE ELEV. ---- PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-22-85 DATE COMPLETED 1-22-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		SAND & GRAVEL-FILL	--						Organic Vapor Rdg.
1.0		Orange-brown loose fine to medium SAND, some silt.	SM		1	DO	--	--	1 ppm
					2	DO	--	--	1 ppm
					3	DO	--	--	1 ppm
5.5		Bottom of hole 5.5 ft.							

Job No. 853-3079 4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00112

BORING LOG ST4

SHEET 1 OF 1

SURFACE ELEV. 139.9 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-22-85 DATE COMPLETED 1-22-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		TOPSOIL	--						Organic Vapor Rdg.
1.0		Loose orange-brown fine to medium SAND, some silt.	SM		1	DO	--	--	<1 ppm
					2	DO	--	--	<1 ppm
					3	DO	--	--	4 ppm
5.5		Bottom of hole 5.5 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00113

BORING LOG ST5

SHEET 1 OF 1

SURFACE ELEV. 138.7 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-22-85 DATE COMPLETED 1-22-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		SAND & GRAVEL-FILL	--						Organic Vapor Rdg.
1.0		Loose yellow-brown fine to medium SAND, some silt.	SM		1	DO	--	--	2 ppm
					2	DO	--	--	1 ppm
					3	DO	--	--	1.5 ppm
5.5		Bottom of hole 5.5 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00114

BORING LOG ST6

SHEET 1 OF 1

SURFACE ELEV. --- PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-22-85 DATE COMPLETED 1-22-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		SAND & GRAVEL-FILL	--						Organic Vapor Rdg.
1.0		Loose yellow-brown fine to medium SAND, some silt.	SM		1	DO	--	--	4 ppm
					2	DO	--	--	6 ppm
					3	DO	--	--	10 ppm
6.5		Firm yellow-gray to brown fine SAND, some silty clay.	SC		4	DO	--	--	1 ppm
8.0		Bottom of hole 8.0 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00115

BORING LOG ST7

SHEET 1 OF 1

SURFACE ELEV. 140.6 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-22-85 DATE COMPLETED 1-22-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		SAND & GRAVEL-FILL	--						Organic Vapor Rdg.
1.0		Loose orange brown fine to medium SAND, some silt.	SM		1	DO	--	--	20 ppm
					2	DO	--	--	35 ppm
					3	DO	--	--	40 ppm
					4	DO	--	--	50 ppm
					5	DO	--	--	35 ppm
10.0		Compact light gray to orange brown firm SAND, some silty clay.	SC		6	DO	--	--	20 ppm
					7	DO	--	--	70 ppm
15.5		Bottom of hole 15.5 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

5 TO 00116

BORING LOG ST8

SHEET 1 OF 1

SURFACE ELEV. 140.3 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		SAND & GRAVEL-FILL	--						Organic Vapor Rdg.
1.0		Loose orange brown fine to medium SAND, some silt.	SM		1	DO	--	--	3 ppm
					2	DO	--	--	3 ppm
					3	DO	--	--	4 ppm
					4	DO	--	--	---
11.0		Compact light gray to orange-brown moist fine to medium SAND, some silty clay.	SC		5	DO	--	--	25 ppm
12.5		Bottom of hole 12.5 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00117

BORING LOG ST9

SHEET 1 OF 1

SURFACE ELEV. 140.4 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
									Organic Vapor Rdg.
0.5		SAND & GRAVEL-FILL							
		Loose yellow-brown fine to medium SAND, some silt.	SM		1	DO	--	--	50 ppm
					2	DO	--	--	35 ppm
8.5		Compact light gray to orange-brown fine to medium SAND, some silty clay.	SC		3	DO	--	--	40 ppm
10.0		Bottom of hole 10.0 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 12 00118

BORING LOG ST9-A

SHEET 1 OF 1

SURFACE ELEV. --- PROJECT SCDHEC/Bluff Rd./S.C.

DATUM --- DATE STARTED 12/3/85 DATE COMPLETED 12/3/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Refer to Boring ST9 for stratigraphy.			1	TO	---	0.5/0.3	
					2	TO	---	0/2.0	
					3	TO	---	2.0/2.0	
7.0		Bottom of Hole at 7.0 ft.							

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn KJB
Checked MTF

3 10 00119

BORING LOG ST10

SHEET 1 OF 1

SURFACE ELEV. 138.5 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Loose light brown fine to medium SAND, some silt.	SM						Organic Vapor Rdg.
					1	DO	--	--	90 ppm
					2	DO	--	--	45 ppm
9.0		Compact light gray medium to fine SAND, some silty clay.	SC		3	DO	--	--	50 ppm
10.0		Bottom of hole 10.0 ft.							

Job No. 853-3079.4

Scale 1"=5'

Golder Associates

Drawn AES

Checked MTF

3 10 00120

BORING LOG ST11

SHEET 1 OF 1

SURFACE ELEV. 138.0 PROJECT SCDHEC/BLUFF RD./S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Loose orange-brown fine to medium SAND, some silt.	SM						Organic Vapor Rdg.
					1	DO	--	--	40 ppm
					2	DO	--	--	10 ppm
8.5		Compact light gray medium to fine SAND, some silty clay with gray lenses.	SC		3	DO	--	--	30 ppm
10.0		Bottom of hole 10.0 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00121

BORING LOG ST11-A

SHEET 1 OF 1

FACE ELEV. --- PROJECT SCDHEC/Bluff Rd./S.C.

DATUM --- DATE STARTED 12/3/85 DATE COMPLETED 12/3/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Dark brown fine SAND, little silt	SP-SM	--	1	TO	---	2.3/2.0	
2.5		Orange-brown fine SAND, some clayey silt	SC	--	2	TO	---	1.9/2.0	
5.0		Bottom of Hole at 5.0 ft.							

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn KJB
Checked MTF

3 10 00122

BORING LOG ST11-B

SHEET 1 OF 1

SURFACE ELEV. --- PROJECT SCDHEC/Bluff Rd./S.C.

DATUM --- DATE STARTED 12/3/85 DATE COMPLETED 12/3/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Dark brown fine SAND, little silt	SP-SM	--	1	TO	---	1.8/2.0	
3.0		Bottom of Hole at 3.0 ft.							

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn KJB
Checked MTF

3 10 00123

BORING LOG ST12

SHEET 1 OF 1

SURFACE ELEV. 137.2 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Loose yellow-gray fine to medium SAND, some silt.	SM						Organic Vapor Rdg.
					1	DO	--	--	75 ppm
2.5		Loose dark gray fine to medium SAND, some silt.	SM		A	AS	--	--	10 ppm
3.5		Light gray to orange-brown fine to medium SAND, little silty clay.	SP SM		2	DO	--	--	60 ppm
9.0		Light to dark gray medium to fine SAND, some silty clay.	SC		3	DO	--	--	45 ppm
					4	DO	--	--	40 ppm
15.0		Bottom of hole 15.0 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00124

BORING LOG ST13

SHEET 1 OF 1

SURFACE ELEV. 141.2 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV./DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		SAND & GRAVEL-FILL	-						Organic Vapor Rdg.
					1	DO	--	--	20 ppm
2.0		Loose brown to gray-brown fine to medium SAND, some silt.							
					2	DO	--	--	40 ppm
			SM						
8.5		Compact yellow-brown medium to fine SAND, some silt.	SM		3	DO	--	--	40 ppm
10.0		Bottom of hole 10.0 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00125

BORING LOG ST14

SHEET 1 OF 1

SURFACE ELEV. 141.0 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV./DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		SAND & GRAVEL-FILL	-						Organic Vapor Rdg.
1.5		Red brown fine to medium SAND, little silt.	SP-SM		1	DO	--	--	25 ppm
3.5		Loose yellow-brown fine to medium SAND, some silt.	SM		2	DO	--	--	70 ppm
8.5		Compact yellow brown to light gray medium to fine SAND, some silty clay.	SC		3	DO	--	--	50 ppm
10.0		Bottom of hole 10.0 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00126

BORING LOG ST15

SHEET 1 OF 1

SURFACE ELEV. 141.2 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Red-brown fine to medium SAND, little silt-FILL	SP-SM						Organic Vapor Rdg.
					1	DO	--	--	10 ppm
2.5		Loose yellow-brown fine to medium SAND, some silt.	SM						
					2	DO	--	--	10 ppm
8.5		Compact light gray to orange brown medium to fine SAND, some silty clay.	SC		3	DO	--	--	20 ppm
					4	DO	--	--	10 ppm
15.0		Bottom of hole 15.0 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00127

BORING LOG ST16

SHEET 1 OF 1

SURFACE ELEV. 140.1 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Loose yellow-gray to orange-brown fine to medium SAND, some silt.	SM		1	DO	--	--	Organic Vapor Rdg. 20 ppm
					2	DO	--	--	30 ppm
8.5		Compact orange-brown to light gray medium to fine SAND, some silty clay.	SC		3	DO	--	--	40 ppm
					4	DO	--	--	----
15.0		Bottom of hole 15.0 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00128

BORING LOG ST17

SHEET 1 OF 1

SURFACE ELEV. 138.9 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV./DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Waste lime-very soft light gray CLAY.	--						Organic Vapor Rdg.
					1	DO	--	--	15 ppm
6.5		Stiff medium gray CLAY, and fine sand.	CL		2	DO	--	--	40 ppm
9.0		Compact light gray medium to fine SAND, some silty clay.	SC		3	DO	--	--	4 ppm
11.5		Bottom of hole 11.5 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

3 10 00129

BORING LOG ST19

SHEET 1 OF 1

SURFACE ELEV. 137.9 PROJECT SCDHEC/BLUFF ROAD/S.C.

DATUM MSL DATE STARTED 1-23-85 DATE COMPLETED 1-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Loose orange-brown fine to medium SAND, some silt.	SM						Organic Vapor Rdg.
					1	DO	--	--	30 ppm
					2	DO	--	--	40 ppm
7.5		Compact light gray medium to fine SAND, some silty clay.	SC						
					3	DO	--	--	70 ppm
9.5		Loose light gray medium to coarse SAND, some silt.	SM						
					4	DO	--	--	25 ppm
15.0		Bottom of hole 15.0 ft.							

Job No. 853-3079.4
Scale 1"=5'

Golder Associates

Drawn AES
Checked MTF

Appendix A-2

Borings for Well Installations

Appendix A-2

Borings for Well Installations

3 10 00132

BORING LOG BP-1

SHEET 1 OF 2

SURFACE ELEV. 138.3 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-12-85 DATE COMPLETED 2-13-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
138.3									
0.0		Gray to gray-brown fine to medium SAND, little silt.	SP-SM						
133.3									
5.0		Compact brown and tan fine SAND, some silty clay.	SC	9	1	DO	10-4-5	18/18	
				10	2	DO	4-5-5	--	*
				-	3	DO	--	--	
				10	4	DO	4-5-5	24/24	
				14	5	DO	5-6-8	24/24	*
				2	6	DO	1-1-1	18/18	
124.3									
14.0		Compact to loose tan fine to medium to fine to coarse SAND, little to trace silt, strata becomes cleaner and coarser with depth.	SP-SM to SP	7	7	DO	2-3-4	18/18	
				18	8	DO	7-8-10	12/18	
				-	9	DO	--	--	*
				-	10	DO	--	0/18	*
				-	11	DO	--	--	*
103.3									
35.0		See Description on Sheet 2							
100.8									

*Splitspoon driven additional 6" to increase sample recovery.

37.5 Continued on sheet 2

Job No. 853-3079

Scale 1"=5'

Golder Associates

Drawn MTF

Checked MTF

3 10 00133

BORING LOG BP-1

SHEET 2 OF 2

SURFACE ELEV. 138.3 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-12-85 DATE COMPLETED 2-13-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
100.8									
37.5		Loose light gray to buff fine SAND, little silt.	SP-SM	-	12	DO	--	--	*
				-	13	DO	--	--	*
90.8				-	14	DO	--	--	*
47.5		Very stiff light gray SILTY CLAY to black plastic CLAY, some fine sand.	CH	-	15	DO	--	--	*
88.8									
50.0		Bottom of Hole at 50.0'							

* Splitspoon driven additional 6" to increase sample recovery.

A monitoring well was installed in this boring. Refer to Monitoring Well Log for details.

Job No. 853-3079
Scale 1" =5'

Golder Associates

Drawn MTF
Checked MTF

3 10 00134

BORING LOG BP-2

SHEET 1 OF 2

SURFACE ELEV. 137.2 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-14-85 DATE COMPLETED 2-14-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
137.2									
0.0		Loose to compact brown fine SAND and silty clay.	SC	7	1	DO	1-3-4	8/18	
				13	2	DO	3-5-8	6/18	
132.2									
5.0		Compact tan and brown fine SAND, some silt.	SM	18	3	DO	11-8-10	18/18	
				9	4	DO	3-4-5	12/18	
124.7				8	5	DO	2-3-5	15/18	
12.5		Loose tan fine to medium SAND, little silt.		11	6	DO	3-5-6	18/18	
			SP-SM	11	7	DO	5-5-6	18/18	
				10	8	DO	3-4-6	18/18	
				-	9	DO	--	0/18	*
				-	10	DO	--	18/18	*
99.7									* Splitspoon driven additional 6" to increase sample recover
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn MTF Checked MTF

3 10 00135

BORING LOG BP-2

SHEET 2 OF 2

SURFACE ELEV. 137.2 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-14-85 DATE COMPLETED 2-14-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
99.7									
37.5		Loose tan fine to medium SAND, little silt.	SP-SM	-	11		--	18/18	*
				29	12		17-14-15	0/18	*
90.7									
46.5		Very stiff gray SILTY CLAY, little fine sand.	CH						
88.2				86	13		16-36-50	18/18	
49.0		Hole terminated at 49.0							* Splitspoon driven an additional 6" to increase sample recovery. A monitoring well was installed in this boring. Refer to Monitoring Well Log for details.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn MTF
Checked MTF

3 10 00136

BORING LOG BP-3

SHEET 1 OF 2

SURFACE ELEV. 137.5 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 4-15-85 DATE COMPLETED 4-16-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
137.5									
0.0		Brown fine SAND, some silt.	SM	6	1	DO	3-3-3	18/18	
135.0									
2.5		Brown fine to medium SAND, some clayey silt.	SC	14	2	DO	3-6-8	15/18	
				-	3	DO	--	24/24	
127.5				11	4	DO	5-6-5	12/18	
10.0		Tan fine to medium SAND, some silt.	SM	7	5	DO	3-4-3	18/18	
22.5				7	6	DO	3-3-4	18/18	
15.0		Tan to buff fine to medium SAND, trace silt.	SP	7	7	DO	2-3-4	15/18	
				6	8	DO	3-3-3	0/18	
				-	9	DO	--	18/18	*
				1	10	DO	--	18/18	*
				-	11	DO	--	12/18	*
100.0									* Splitspoon driven additional 6" to increase sample recovery.
37.5		Continued on Sheet 2							

Job No. 853-3079

Scale 1"=5'

Golder Associates

Drawn MTF

Checked MTF

3 10 00137

BORING LOG BP-3

SHEET 2 OF 2

SURFACE ELEV. 137.5 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 4-15-85 DATE COMPLETED 4-16-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
100.0									
37.5		Tan to buff fine to medium SAND, trace silt.	SP	-	12	DO	--	3/3	
				-	13	WS	--	--	Sample 13 taken from washings.
				-	14	DO	--	18/18	*
				-	15	DO	--	10/18	*
90.1				16	16	DO	6-10-6	18/18	
47.4 / 88.5		Firm gray CLAY, some fine sand.	CH	-					
49.0		Bottom of Hole at 49.0'			17	DO	--	6/6	* Splitspoon driven additional 6" to increase sample recovery.
									A monitoring well was installed in this boring. Refer to Monitoring Well Log for details.

Job No. 853-3079
Scale 1" = 5'

Golder Associates

Drawn MTF
Checked MTF

3 10 00138

BORING LOG BP-4

SHEET 1 OF 2

SURFACE ELEV. 134.9 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 4-17-85 DATE COMPLETED 4-18-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
134.9									
0.0		Brown and light gray fine SAND and silty clay	SC	11	1	DO	1-5-6	9/18	
				28	2	DO	8-12-16	12/18	
126.9				19	3	DO	4-10-9	16/18	
8.0		Gray fine to coarse SAND little to some silt.	SM	6	4	DO	4-3-3	18/18	
				-	5	DO	--	--	
119.9				6	6	DO	2-3-3	18/18	
15.0		Tan and buff fine to coarse SAND, trace fine gravel, trace silt.	SP	-	7	DO	--	0/18	*
				6	8	DO	2-3-3	18/18	
				-	9	DO	--	18/18	*
99.9				9	10	DO	5-5-4	10/18	*Splitspoon driven additional 6" to increase sample recovery.
35.0		See description on Sheet 2							
97.4									

37.5 Continued on Sheet 2

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn MTF Checked MTF

3 10 00139

BORING LOG BP-4

SHEET 2 OF 2

SURFACE ELEV. 134.9 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 4-17-85 DATE COMPLETED 4-18-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
97.4									
37.5		Light brown fine to medium SAND, little silt, trace fine gravel	SP-SM	10	11	DO	2-3-7	12/18	
91.4									
43.5 / 89.9		Very hard black CLAY, some coarse to medium sand	CH	80	12	DO	28-30-50	6/18	
45.0		Bottom of Hole at 45.0'							A monitoring well was installed in this boring. Refer to Monitoring Well Log for details.

Job No. 853-3079
Scale 1" = 5'

Golder Associates

Drawn MTF
Checked MTF

3 10 00140

BORING LOG BP-5

SHEET 1 OF 2

SURFACE ELEV. 137.7 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 4-19-85 DATE COMPLETED 4-19-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
137.7									
0.0		Brown fine SAND and silt	SM						
				10	1	DO	3-5-5	10/18	
134.7									
3.0		Brown fine to medium SAND, some silt.	SM	-	2	DO	--	18/18	
131.3									
6.4		Tan to buff fine to medium SAND, trace silt.		19	3	DO	7-9-10	18/18	
				11	4	DO	4-6-5	18/18	
				7	5	DO	3-3-4	18/18	
				8	6	DO	2-3-5	18/18	
			SP						
				-	7	DO	--	18/18	*
				4	8	DO	1-2-2	0/18	
				-	9	DO	--	0/18	*
				5	10	DO	3-2-3	18/18	
100.2									

*Splitspoon driven additional 6" to increase sample recovery.

37.5 Continued on Sheet 2

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn MTF Checked MTF

3 10 00141

BORING LOG BP-5

SHEET 2 OF 2

SURFACE ELEV. 137.7 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 4-19-85 DATE COMPLETED 4-19-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
100.2									
37.5		Tan to buff fine to medium SAND, trace silt.	SP	5	11	DO	1-3-2	0/18	
				–	12	DO	--	--	*
90.7									
47.0 / 89.2		Very stiff gray SILTY CLAY, some fine sand.	CH	51	13	DO	10-19-32	--	
48.5		Bottom of Hole at 48.5'							*Splitspoon driven an additional 6" to increase sample recovery. A monitoring well was installed in this boring. Refer to Monitoring Well Log for details.

Job No. 853-3079
Scale 1" =5'

Golder Associates

Drawn MTF
Checked MTF

3 10 00142

BORING LOG P-6

SHEET 1 OF 2

SURFACE ELEV. 140.2 PROJECT SCDHEC/Bluff Rd./S.C.

DATUM MSL DATE STARTED 8-13-85 DATE COMPLETED 8-13-85

DRILL RIG CME 45 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
140.2									
0.0		Compact, reddish brown, fine SAND some silty clay.	SM						
				10	1	DO	3-5-5	15/18	
				10	2	DO	5-5-5	15/18	
25.2									
15.0		Very loose, tan fine SAND little silt.	SP-SM	3	3	DO	1-2-1	14/18	
				1	4	DO	1-1-0	12/18	
		grading to,							
				1	5	DO	1-0-1	13/18	
		Compact, tan fine to medium SAND trace silt.	SP	19	6	DO	4-9-10	18/18	
				12	7	DO	5-6-6	18/18	
102.7									
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00143

BORING LOG P-6

SHEET 2 OF 2

SURFACE ELEV. 140.2 PROJECT SCDHEC/Bluff Rd./S.C.

DATUM MSL DATE STARTED 8-13-85 DATE COMPLETED 8-13-85

DRILL RIG CME 45 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
102.7									
37.5		Compact, tan fine to medium SAND trace silt.	SP						
				9	8	DO	3-3-6	15/18	
93.2				33	9	DO	13-18-15	8/18	
47.0		Hard, white and brown CLAY trace fine to medium sand.	CH	92	10	DO	22-41-51	~~11.5~~ 18	
91.2									
49.0		Boring Complete at 49.0 ft. See Well Installation Log.							

Job No. 853-3079

Scale 1"=5'

Golder Associates

Drawn SKB

Checked WBL

3 10 00144

BORING LOG P-7

SHEET 1 OF 2

SURFACE ELEV. 139.9 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8-14-85 DATE COMPLETED 8-14-85

DRILL RIG CME 45 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
139.9									
0.0		Compact, reddish brown fine SAND some clayey silt.	SM						
				12	1	DO	4-6-6	18/18	
				14	2	DO	5-7-7	12/18	
123.4			SM	1	3	DO	1-0-1	7/18	
16.5									
				5	4	DO	1-2-3	12/18	
		Compact, tan fine to medium SAND trace silt.	SP	7	5	DO	3-3-4	12/18	
				4	6	DO	1-2-2	-/18	
102.4				11	7	DO	1-3-8	-/18	
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00145

BORING LOG P-7

SHEET 2 OF 2

SURFACE ELEV. 139.9 PROJECT SCDHEC/Bluff Rd./S.C.

DATUM MSL DATE STARTED 8-14-85 DATE COMPLETED 8-14-85

DRILL RIG CME 45 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
102.4									
37.5 99.9		Compact, tan fine to medium SAND trace silt.	SP						
40.0		Very stiff, gray and brown CLAY little fine sand.	CH	10	8	DO	5-5-5	15/18	
93.4				30	9	DO	13-13-17	8/18	
46.5		Boring Complete at 46.5 ft. See Well Installation Log.							

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00146

BORING LOG P-8

SHEET 1 OF 2

SURFACE ELEV. 138.8 PROJECT SCDHEC/Bluff Rd./S.C.

DATUM MSL DATE STARTED 8-20-85 DATE COMPLETED 8-20-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
138.8									
0.0		Gravel Fill	-						
136.3									
2.5		Compact, tan fine to medium SAND trace to little silt.	SP-SM						
				41	1	DO	15-23-18	15/18	
				13	2	DO	4-6-7	12/18	OVA= 0.0 ppm
				7	3	DO	3-3-4	/18	OVA= 0.0 ppm
118.8									
20.0		Compact to loose, tan fine to medium SAND trace silt.	SP	10	4	DO	2-5-5	10/18	OVA= 0.0 ppm
				10	5	DO	3-4-6	0/18	
				12	6	DO	3-6-6	5/18	OVA= 0.0 ppm
				8	7	DO	4-4-4	0/18	
101.3									
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00147

BORING LOG P-8

SHEET 2 OF 2

SURFACE ELEV. 138.8 PROJECT SCDHEC/Bluff Rd./S.C.

DATUM MSL DATE STARTED 8-20-85 DATE COMPLETED 8-20-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
101.3 / 37.5		Compact to loose, tan fine to medium SAND trace silt.	SP						
				1	8	DO	1-0-1	10/18	OVA= 0.0 ppm
				3	9	DO	1-1-2	9/18	OVA= 0.0 ppm
89.3 / 49.5		Stiff, black to dark gray CLAY little fine to medium sand.	CH	45	10	DO	10-19-26	9/18	
87.3 / 51.5		Boring Complete at 51.5 ft. See Well Installation Log.							

Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00148

BORING LOG P-9

SHEET 1 OF 2

SURFACE ELEV. 138.5 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8-21-85 DATE COMPLETED 8-21-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
138.5									
0.0		Hard, light brown SILT some fine sand.	ML						
132.5				44	1	DO	17-19-25	18/18	OVA= 1.0 ppm
6.0		Loose, tan fine SAND little silt.	SP-SM						
				9	2	DO	3-5-4	12/18	OVA= 6.2 ppm
				7	3	DO	2-3-4	18/18	OVA= 5.0 ppm
119.0									
19.5		Loose, tan fine SAND, trace silt.	SP	8	4	DO	3-5-4	13/18	OVA= 2.5 ppm
				6	5	DO	2-3-3	0/18	
				1	6	DO	1-0-1	10/18	OVA= 0.4 ppm
				-	7	DO	--	12/18	OVA= 1.0 ppm
101.0									
37.5		Continued on Sheet 2							

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00149

BORING LOG P-9

SHEET 2 OF 2

SURFACE ELEV. 138.5 PROJECT SCDHEC/Bluff Rd./S.C.

DATUM MSL DATE STARTED 8-21-85 DATE COMPLETED 8-21-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
101.0									
37.5		Loose, tan fine SAND, trace silt.	SP						
				3	8	DO	2-1-2	10/18	OVA= 1.6 ppm
				2	9	DO	1-1-1	14/18	OVA= 3.2 ppm
89.0									
49.5		Stiff, gray CLAY trace fine sand.	CH	34	10	DO	7-14-20	18/18	OVA= 0.3 ppm
87.5									
51.0		Boring Complete at 51.0 ft. See Well Installation Log.							

Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00150

BORING LOG P-10

SHEET 1 OF 2

SURFACE ELEV. 139.2 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8-22-85 DATE COMPLETED 8-22-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
139.2									
0.0		Stiff, light brown and gray CLAY trace fine sand.	CL						
				39	1	DO	10-16-23	14/18	OVA= 0.3 ppm
				32	2	DO	10-15-17	17/18	OVA= 0.0 ppm
124.2									
15.0		Loose to compact, tan fine to medium SAND, trace silt.	SP	1	3	DO	1-0-1	-/18	OVA= 0.5 ppm
				11	4	DO	3-5-6	0/18	
				15	5	DO	5-7-8	8/18	OVA= 2.0 ppm
				8	6	DO	7-5-3	8/18	OVA= 1.0 ppm
				2	7	DO	1-1-1	8/18	OVA= 0.4 ppm
101.7									
37.5		Continued on Sheet 2							

Job No. 353-3079

Scale 1"=5'

Golder Associates

Drawn SKB

Checked WBL

3 10 00151

BORING LOG P-10

SHEET 2 OF 2

SURFACE ELEV. 139.2 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8-22-85 DATE COMPLETED 8-22-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
101.7									
37.5		Loose to compact, tan fine to medium SAND some grading to trace silt.	SM to SP						
				1	8	DO	1-0-1	18/18	OVA= 0.0 ppm
				12	9	DO	4-4-8	10/18	OVA= 0.2 ppm
89.7									
49.5									
87.7		Firm, dark gray CLAY trace fine to medium sand.	CH	45	10	DO	9-16-28	17/18	OVA= 0.0 ppm
51.5		Boring Complete at 51.5 ft. See Well Information Log.							

Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00152

BORING LOG P-11

SHEET 1 OF 2

SURFACE ELEV. 137.9 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8-23-85 DATE COMPLETED 8-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	SAMPLES: BLOWS/FOOT	NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ATT.	REMARKS
137.9 / 0.0		Stiff, light brown to reddish brown CLAY, trace fine sand.	CL						
				63	1	DO	10-23-40	16/18	OVA= 0.2 ppm
				29	2	DO	7-14-15	14/18	OVA= 0.1 ppm
122.9 / 15.0		Loose to compact, tan fine to medium SAND little grading to trace silt.	SP	3	3	DO	1-0-3	11/18	OVA= 0.0 ppm
				8	4	DO	3-4-4	11/18	OVA= 0.0 ppm
				10	5	DO	3-5-5	4/18	OVA= 0.0 ppm
				4	6	DO	1-1-3	12/18	OVA= 4.3 ppm
				6	7	DO	3-3-3	5/18	OVA= 1.2 ppm
100.4 / 37.5									

Continued on Sheet 2

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00153

BORING LOG P-11

SHEET 2 OF 2

SURFACE ELEV. 137.9 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8-23-85 DATE COMPLETED 8-23-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
100.4									
37.5		Loose to compact, tan fine to medium SAND little grading to trace silt.	SP	13	8	DO	4-6-7	0/18	
				6	9	DO	2-2-4	6/18	OVA= 0.3 ppm
88.9									
49.0		Stiff, black CLAY trace fine to medium sand.	CH	32	10	DO	9-13-19	16/18	OVA= 0.0 ppm
36.4									
51.5		Boring Complete at 51.5 ft. See Well Installation Log.							

Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00154

BORING LOG P-12

SHEET 1 OF 2

SURFACE ELEV. 135.9 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/25/85 DATE COMPLETED 8/25/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
135.9									
0.0		Stiff, light brown and white CLAY trace fine sand.	CL						
129.4				53	1	DO	8-22-31	18/18	OVA= 1.0 ppm
6.5		Loose, tan fine SAND some silt.	SM						
				5	2	DO	3-2-3	14/18	OVA= 3.8 ppm
120.9									
15.0				3	3	DO	3-2-1	18/18	OVA= 0.1 ppm
		Compact, tan fine to coarse SAND trace silt.	SP	1	4	DO	1-0-1	18/18	OVA= 0.0 ppm
				4	5	DO	1-2-2	10/18	OVA= 0.0 ppm
				10	6	DO	3-5-5	12/18	OVA= 5.3 ppm 2nd reading OVA= 0.4 ppm
98.4				9	7	DO	3-4-5	4/18	OVA= 0.5 ppm
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00155

BORING LOG P-12

SURFACE ELEV. 135.9 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/25/85 DATE COMPLETED 8/25/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
98.4 / 37.5		Compact, tan fine to coarse SAND trace silt.	SP						
				10	8	DO	3-4-6	8.5/18	OVA= 0.0 ppm
89.4				16	9	DO	6-8-8	9/18	OVA= 0.0 ppm
46.5		Stiff, dark gray CLAY.	CH						
85.9				59	10	DO	10-19-40	13/18	OVA= 0.0 ppm
50.0		Boring Complete at 50.0 ft. See Well Installation Log.							

Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00156

BORING LOG P-13

SHEET 1 OF 2

SURFACE ELEV. 139.6 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/26/85 DATE COMPLETED 8/26/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	SAMPLES: BLOWS/FOOT	NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ATT.	REMARKS
139.6 / 0.0		Stiff, light brown and white CLAY trace fine sand.	CL						
133.1 / 6.5				90	1	DO	24-40-50	18/18	OVA= 0.2 ppm
		Loose, tan fine SAND some silt.	SM						
				12	2	DO	4-5-7	12/18	OVA= 22.0 ppm
123.1 / 16.5				9	3	DO	4-5-4	11/18	OVA= 90.0 ppm
		Compact, tan fine to coarse SAND trace silt.	SP	4	4	DO	1-2-2	0/18	OVA= 15.0 ppm
				10	5	DO	2-4-6	10/18	OVA= 6.2 ppm
				3	6	DO	2-1-2	13/18	OVA= 0.0 ppm
				7	7	DO	3-4-3	0/18	OVA > 1000 ppm probably instrument error.
102.1 / 37.5									

Continued on Sheet 2

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00157

BORING LOG P-13

SHEET 2 OF 2

SURFACE ELEV. 139.6 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/26/85 DATE COMPLETED 8/26/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
102.1									
37.5		Compact, tan fine to coarse SAND trace silt, trace fine gravel.	SP						
				2	8	DO	2-1-1	9/18	
				10	9	DO	5-5-5	-/18	
89.6									
50.0		Stiff, dark gray to black CLAY.	CH	76	10	DO	11-26-50	16/18	
88.1									
51.5		Boring Complete at 51.5 ft. See Well Installation Log.							

Note: OVA refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00158

BORING LOG P-14

SHEET 1 OF 2

SURFACE ELEV. 138.7 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/27/85 DATE COMPLETED 8/27/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
138.7									
0.0		Stiff, light brown and white CLAY trace fine sand.	CL						
				92	1	DO	16-42-50	16/16	
128.7									
10.0		Loose, tan, fine SAND, some silt.	SM	14	2	DO	4-6-8	14/18	
23.7									
15.0				4	3	DO	WH-WH-4	13/18	
				14	4	DO	2-6-8	6/18	
		Compact, light brown, fine to coarse SAND, trace silt, trace fine gravel.	SP	7	5	DO	2-3-4	12/18	
101.2									
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00159

BORING LOG P-14

SHEET 2 OF 2

SURFACE ELEV. 138.7 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/27/85 DATE COMPLETED 8/27/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ATT.	
101.2									
37.5 88.7		Compact, light brown, fine to coarse SAND, trace silt, trace fine gravel.	SP						
50.0 87.2		Stiff, gray CLAY.	CH	59	6	DO	14-23-36	10/18	
51.5		Boring Complete at 51.5 ft. See Well Installation Log.							

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00160

BORING LOG P-15

SHEET 1 OF 2

SURFACE ELEV. 137.6 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 9/3/85 DATE COMPLETED 9/3/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: HAMMER BLOWS PER 6 IN.	SAMPLES: REC./ATT.	REMARKS
137.6 0.0		Light brown CLAY trace fine sand.	CL						Note: Where samples were not taken boring was logged from auger cuttings.
130.1 7.5		Tan fine SAND some silt.	SM						
122.6 15.0		Compact, tan fine to medium SAND, trace silt.	SP						
100.1 37.5		Continued on Sheet 2							

Job No. 853-3079

Scale 1"=5'

Golder Associates

Drawn SKB

Checked WBI

3 10 00161

BORING LOG P-15

SHEET 2 OF 2

SURFACE ELEV. 137.6 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 9/3/85 DATE COMPLETED 9/3/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
100.1									
37.5		Compact, tan fine to medium SAND, trace silt.	SP						
				13	1	DO	4-7-6	16/18	
89.6									
48.0		Stiff, gray CLAY.	CH	-	2	RC	--	9/14	
87.9									
.7		Boring Complete at 49.7 ft. See Well Installation Log.							

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00162

BORING LOG P-16

SHEET 1 OF 2

SURFACE ELEV. 138.5 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 9/4/85 DATE COMPLETED 9/4/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
138.5									
0.0		Firm, light brown and white CLAYEY SILT little fine sand.	ML						
127.5				18	1	DO	7-9-9	12/18	
11.0		Compact, tan fine to medium SAND little to trace silt.	SP-SM to SP						
				10	2	DO	3-5-5	16/18	
101.0									
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00163

BORING LOG P-16

SHEET 2 OF 2

FACE ELEV. 138.5 PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 9-4-85 DATE COMPLETED 9-4-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
101.0									
37.5		Compact, tan fine to medium SAND little to trace silt.	SP-SM to SP						
89.0									
[illegible].5 [illegible].6		Stiff, dark gray CLAY.	CH	-	3	TO	PUSHED	17/17	
50.9		Boring Complete at 50.9 ft. See Well Installation Log.							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn SKB Checked WBL

3 10 00164

BORING LOG P-17

SHEET 1 OF 1

SURFACE ELEV. 134.2 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/15/85 DATE COMPLETED 11/15/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
134.2									
0.0		Compact fine SAND and silty clay	SC						
				26	1	DO	6-11-15	18/18	OVA = 0.3 ppm
124.7									
9.5		Loose gray slightly micaceous fine to medium SAND trace silt	SP	11	2	DO	6-5-6	18/18	OVA = 2.0 ppm
				7	3	DO	2-4-3	18/18	OVA = 44 ppm
115.2									
19.0		Boring terminated at 19.0'. See Monitoring well log for well details							

Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn LJW
Checked AES

3 10 00165

BORING LOG P-18

SHEET 1 OF 2

SURFACE ELEV. 139.2 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/13/85 DATE COMPLETED 11/13/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
139.2									
0.0		Compact gray to red brown fine SAND some silty clay	SC						
				24	1	DO	3-6-16	18/18	OVA = 0.0 ppm
				14	2	DO	3-6-8	---	OVA = 0.0 ppm
24.7									
14.5		Loose gray fine to coarse SAND, trace to little silt, trace to little fine gravel	SP	8	3	DO	2-3-5	18/18	OVA = 0.0 ppm
				13	4	DO	8-7-6	18/18	OVA = 0.0 ppm
				12	5	DO	4-6-6	3/18	OVA = 0.0 ppm
				4	6	DO	2-3-1	4/18	OVA = 0.0 ppm
101.7									
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn LJW Checked AES

3 10 00166

BORING LOG P-18

SHEET 2 OF 2

FACE ELEV. 139.2 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/13/85 DATE COMPLETED 11/13/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
101.7									
37.5		Loose gray fine to coarse SAND, trace to little silt, trace to little fine gravel	SP						
				12	7	DO	5-5-7	6/18	OVA = 0.0 ppm
									Black Mingo clay probably encountered at 52.0', however, attempts to obtain sample failed.
86.9				24	8	DO	8-12-12	0/18	
52.3		Boring terminated at 52.3'. See Monitoring well logs for well details							

Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn LJW
Checked AES

3 19 00167

BORING LOG P-19

SHEET 1 OF 2

SURFACE ELEV. 137.6 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/15/85 DATE COMPLETED 11/15/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
137.6									
0.0		Compact yellow brown fine SAND and silty clay, with pockets of gray, fine sand, trace silt	SC						
				22	1	DO	7-7-15	18/18	OVA = 0.0 ppm
				17	2	DO	10-9-8	12/18	OVA = 0.0 ppm
23.1									
14.5		Loose light gray fine to coarse SAND trace to little clayey silt	SP	7	3	DO	7-3-4	14/18	OVA = 0.0 ppm
				11	4	DO	5-5-6	0/18	
				5	5	DO	2-2-3	8/18	OVA = 0.0 ppm
100.1									
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn LJW Checked AES

3 10 00168

BORING LOG P-19

SHEET 2 OF 2

SURFACE ELEV. 137.6 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/15/85 DATE COMPLETED 11/15/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
100.1									
37.5		Loose light gray fine to coarse SAND trace to little clayey silt	SP						
87.6				31	6	DO	10-11-20	6/18	OVA = 0.0 ppm
50.0 87.1		Stiff very dark gray silty CLAY	CH	-	7	DO	Pushed	6/6	
50.5		Boring terminated at 50.5'. See Monitoring well log for well completion details							

Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn LJW Checked AES

3 10 00169

BORING LOG P-20

SHEET 1 OF 2

SURFACE ELEV. 137.0 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/20/85 DATE COMPLETED 11/20/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
137.0									
0.0		Stiff light gray to red brown SILTY CLAY and fine to coarse sand	CL						
				44	1	DO	7-12-32	18/18	OVA = 0.0 ppm
				25	2	DO	15-13-12	18/18	OVA = 0.0 ppm
				10	3	DO	10-6-4	10/18	OVA = 0.4 ppm
119.5									
17.5		Loose light gray fine to coarse SAND trace to little silt, trace to little fine to medium gravel	SP	13	4	DO	5-5-8	6/18	OVA = 0.1 ppm
				7	5	DO	4-3-4	4/18	OVA = 0.1 ppm
99.5									
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn LJW Checked AES

3 10 00170

BORING LOG P-20

SHEET 2 OF 2

SURFACE ELEV. 137.0 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/20/85 DATE COMPLETED 11/20/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
99.5									
37.5		Loose light gray fine to coarse SAND trace to little silt, trace to little fine to medium gravel	SP	9	6	DO	10-4-5	2/18	OVA = 0.0 ppm
89.2									
47.8		Firm medium gray micaceous CLAYEY SILT, some fine sand	ML	42	7	DO	9-13-29	18/18	OVA = 0.2 ppm
87.0									
.0		Boring terminated at 50.0'. See Monitoring well log for well details							

Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn LJW Checked AES

3 10 00171

BORING LOG P-21

SHEET 1 OF 2

SURFACE ELEV. 137.7 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 12/4/85 DATE COMPLETED 12/4/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
137.7 0.0		Stiff mottled orange brown and black SILTY CLAY some fine sand	CL						
				46	1	DO	5-8-38	18/18	OVA = 0.2
127.7				23	2	DO	10-11-12	18/18	OVA = 0.0
10.0		Compact orange brown micaceous fine SAND, some to little clayey silt	SM						
				9	3	DO	4-4-5	10/18	OVA = 0.0
120.2									
17.5		Compact to loose fine to coarse SAND, trace silt	SP						
				18	4	DO	12-10-8	6/18	OVA = 0.3
				4	5	DO	2-2-2	10/18	OVA = 0.8
100.2 37.5									

Continued on Sheet 2

Job No. 853-3079.11
Scale 1"=5'

Golder Associates

Drawn LJW
Checked AES

3 10 00172 **BORING LOG** P-21 SHEET 2 OF 2

SURFACE ELEV. 137.7 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 12/4/85 DATE COMPLETED 12/4/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
100.2									
37.5		Compact to loose fine to coarse SAND, trace silt	SP						
89.5									
48.2		Very stiff medium gray SILTY CLAY some fine sand	CL	-	6	TO	---	---	Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.
88.5									
49.2		Boring terminated at 49.2'. See Monitoring well log for well details.							

Job No. 853-3079.11 Scale 1"=5'

Golder Associates

Drawn JLW Checked AES

3 10 00173

BORING LOG P-22

SHEET 1 OF 2

SURFACE ELEV. 137.8 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/18/85 DATE COMPLETED 11/18/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
137.8									
0.0		Dense to loose tan fine SAND and clayey silt							
			SC	48	1	DO	22-23-25	18/18	OVA = 0.3 ppm
				21	2	DO	9-9-12	18/18	OVA = 0.0 ppm
122.8				4	3	DO	3-1-3	6/18	OVA = 0.0 ppm
15.0		Compact to loose light gray fine to coarse SAND, some clayey silt							
			SM	20	4	DO	9-10-10	12/18	OVA = 0.1 ppm
107.8				9	5	DO	4-5-4	18/18	OVA = 0.1 ppm
30.0		Compact to loose light gray fine to coarse SAND, little clayey silt							
100.3									
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn LJW Checked AES

3 10 00174 **BORING LOG** P-22 SHEET 2 OF 2

SURFACE ELEV. 137.8 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/18/85 DATE COMPLETED 11/18/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
100.3									
37.5		Compact to loose light gray fine to coarse SAND, little clayey silt	SP - SM	4	6	DO	2-2-2	0/18	
89.8									
48.0 / 87.8		Black Mingo Clay	CH	25	7	DO	15-10-15	0/18	
.0		Boring terminated at 50.0'. Unable to install Monitoring Well in this boring due to running sands. This boring backfilled. Monitoring well installed in boring 25 ft. south of this location. See Monitoring Well Log for details.							Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn LJW Checked AES

3 10 00175 **BORING LOG** DW-1 SHEET 1 OF 3

SURFACE ELEV. 136.9 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-18-85 DATE COMPLETED 2-26-85

DRILL RIG CME 55 DRILLING METHOD MUD ROTARY

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
136.9 0.0		Refer to boring BP-2 for stratigraphy above 49ft.							Mud rotary drilled a 9" diameter hole 51 ft, set and grout a 6" diameter casing. After grout seal had set, a 5½" boring was begun at 51ft.
78.9		Scale change at 58 ft.							
58.0		Gray SILTY CLAY, some fine to coarse sand	CH	80	1	DO	23-30-50	3/18	Begin log at 58ft.
75.9									
61.0		Tan fine SAND, little to some silt.	SM	52	2	DO	25-25-27	18/18	
67.9									
69.0		Thinly bedded fine to medium SAND some silty clay.	SM	24	3	DO	12-12	12/12	
				45	4	DO	11-16-29	18/18	
49.4									Sample 5:87.0-89.0
87.5		Continued on Sheet 2							

Job No 853-3079 Scale 1"=5'

Golder Associates

Drawn MTF Checked MTF

3 10 00176

BORING LOG DW-1

SHEET 2 OF 3

SURFACE ELEV. 136.9 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-18-85 DATE COMPLETED 2-26-85

DRILL RIG CME 55 DRILLING METHOD MUD ROTARY

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	SAMPLES: BLOWS/FOOT	NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ATT.	REMARKS
87.5		Thinly bedded fine to medium SAND, some silty clay.	SM	-	5	TO	--	--	Sample 5: 87.0-89.0
				40	6	DO	18-19-21	0/18	
				81	7	DO	26-31-50	18/18	
26.9				85	8	DO	28-35-50/5"	0/17	
110.0		Very stiff light gray and tan SILTY CLAY, trace fine sand.	CL	81	9	DO	31-50	12/12	
				81	10	DO	25-56	12/12	
11.9									
125.0		Continued on Sheet 3							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn MTF Checked MTF

3 10 00177

BORING LOG DW-1

SHEET 3 OF 3

SURFACE ELEV. 136.9 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-18-85 DATE COMPLETED 2-26-85

DRILL RIG CME 55 DRILLING METHOD MUD ROTARY

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
11.9									
125.0 / 10.4		Refer to description on Sheet 2							
126.5		Mottled, white, pink, and lavender fine to medium SAND, some silt.	SM	67	11	DO	24-25-42	18/18	
2.4				75	12	DO	25-50	12/12	
134.5		Brown fine to medium SAND, trace silt.	SP	100+	13	DO	56/6"	6/6	
				100+					
144.0		Hard white SILTY CLAY, little fine sand.	CL		14	DO	59/6"	12/6	A monitoring well was installed in this boring. Refer to Monitoring Well Log for details.
		Bottom of Hole at 144.0 ft.							

Job No. 853-3079

Scale 1" =5'

Golder Associates

Drawn MTF

Checked MTF

3 10 00178

BORING LOG DW-2

SHEET 1 OF 2

SURFACE ELEV. 137.3 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-22-85 DATE COMPLETED 2-23-85

DRILL RIG CME 55 DRILLING METHOD MUD ROTARY

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
137.3 0.0		Refer to boring BP-3 for stratigraphy above 49.0 ft.							Mud rotary drilled a 9" diameter hole to 51.5 ft. set and grouted a 6" diameter casing. After grout seal had set, a 5½" diameter boring was begun at 51.5 ft.
83.8		Scale change at 53.5 ft.							
53.5		Stiff black SILTY CLAY	CH	80	1	DO	19-30-50	--	
80.3									
57.0		Stiff gray SILTY CLAY, some fine sand.	CL	12	2	DO	5-5-7	18/18	
				25	3	DO	10-10-15	18/18	
67.3				33	4	DO	8-11-22	18/18	
70.0		Gray fine to medium SAND, some clayey silt to some silt.	SM	100+	5	DO	20-47-50/5"	17/17	
				100+	6	DO	21-50/4"	10/10	
54.8									
82.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1" = 5'

Golder Associates

Drawn MTF Checked MTF

3 10 00179

BORING LOG DW-2

SHEET 2 OF 2

SURFACE ELEV. 137.3 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-22-85 DATE COMPLETED 2-23-85

DRILL RIG CME 55 DRILLING METHOD MUD ROTARY

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
54.8									
82.5		Gray fine to medium SAND, some silty clay to some silt.	SM	100+	7	DO	17-36-50/4"	16/16	
				100+	8	DO	30-50/3"	9/9	
44.3									
93.0		Hard gray SILTY CLAY, trace fine sand.	CH	100+	9	DO	19-43-50/5"	17/17	
42.3									
95.0		Bottom of Hole at 95.0 ft.							A monitoring well was installed in this boring. Refer to Monitoring Well Log for details.

Job No. 853-3079

Scale 1" = 5'

Golder Associates

Drawn MTF

Checked MTF

3 10 00190

BORING LOG DW-3

SHEET 1 OF 3

SURFACE ELEV. 137.4 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-26-85 DATE COMPLETED 3-1-85

DRILL RIG CME 55 DRILLING METHOD MUD ROTARY

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	SAMPLES: BLOWS/FOOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: HAMMER BLOWS PER 6 IN.	SAMPLES: REC./ATT.	REMARKS
137.4 0.0		Refer to borings BP-3 and DW-2 for stratigraphy above 95 ft.							Mud rotary drilled a 9" diameter hole to 53.5 ft. set and grouted a 6" diameter casing. After grout seal had set a 5½" diameter boring was begun at 53.5 ft.
79.4 58.0		Scale change at 58 ft. Refer to borings BP-3 and DW-2 for stratigraphy above 95 ft.		-	1	TO	--	24/24	
				-	2	TO	--	6/24	
49.9 87.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1" = 5'

Golder Associates

Drawn MTF Checked MTF

3 10 00181

BORING LOG DW-3

SHEET 2 OF 3

ACE ELEV. 137.4 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-26-85 DATE COMPLETED 3-1-85

DRILL RIG CME 55 DRILLING METHOD MUD ROTARY

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
87.5 49.9		Refer to borings BP-3 and DW-1 for stratigraphy above 95 ft.							
38.9		Begin Log at 98.5 ft.							
98.5 37.4		Gray SILTY CLAY, trace fine sand.	CL	100	3	DO	50/6"	4/6	
1.0		Brown fine to medium SAND, trace silt.							
			SP	26	4	DO	12-12-14	6/18	
				40	5	DO	19-19-21	3/18	
12.4									

125.0 Continued on Sheet 3

Job No. 853-3079

Scale 1" =5'

Golder Associates

Drawn MTF

Checked MTF

3 10 00182

BORING LOG DW-3

SHEET 3 OF 3

SURFACE ELEV. 137.4 PROJECT SCDHEC/Bluff Road/SC

DATUM MSL DATE STARTED 2-26-85 DATE COMPLETED 3-1-85

DRILL RIG CME 55 DRILLING METHOD MUD ROTARY

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
12.4									
125.0		Brown fine to medium SAND, trace silt.	SP						
9.4									
128.0		Hard white SILTY CLAY, trace fine sand.	CL	100	6	DO	25-50/6"	12/12	
7.9									
129.5		Bottom of Hole at 129.5 ft.							A monitoring well was installed in this boring. See Monitoring Well Log for details.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn MTF
Checked MTF

3 10 00183

BORING LOG T-1

SHEET 1 OF 1

SURFACE ELEV. - PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/22/85 DATE COMPLETED 8/22/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Stiff, light brown and gray, CLAY trace fine sand.	CL	59	1	DO	10-24-35	16/18	OVA= 0.0 ppm
				47	2	DO	13-22-25	16/18	OVA= 0.4 ppm
				7	3	DO	5-5-2	7/18	OVA= 8.5 ppm
16.5		Boring Complete at 16.5 ft. Backfilled with cuttings to surface.							Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00184

BORING LOG T-2

SHEET 1 OF 1

FACE ELEV. - PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/23/85 DATE COMPLETED 8/23/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Loose tan fine SAND little silt.	SP-SM						
				5	1	DO	1-2-3	13/18	OVA= 9.5 ppm
16.5		Boring Complete at 16.5 ft. Backfilled with cuttings to surface.							Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00165

BORING LOG T-3

SHEET 1 OF 1

SURFACE ELEV. - PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/23/85 DATE COMPLETED 8/23/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Stiff, light brown and white CLAY trace fine sand.	CL						
				29	1	DO	2-13-16	16/18	OVA= 0.3 ppm
				36	2	DO	10-16-20	18/18	OVA= 0.3 ppm
14.5		Loose, white buff fine SAND some silt.	SM	6	3	DO	1-1-5	10/18	OVA= 62.0 ppm
16.0		Boring Complete at 16.0 ft. Backfilled to surface with cuttings.							

Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00186

BORING LOG T-4

SHEET 1 OF 1

SURFACE ELEV. -

PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL

DATE STARTED 8/24/85 DATE COMPLETED 8/24/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Stiff, light brown CLAY trace fine sand.	CL	41	1	DO	10-14-22	16/18	OVA= 1.6 ppm
6.0		Loose, tan, fine SAND some to little silt.	SM to SP-SM	8	2	DO	3-3-5	14/18	OVA= 4.8 ppm
				5	3	DO	1-2-3	12/18	OVA= 0.9 ppm
16.0		Boring Complete at 16.0 ft. Backfilled to surface with cuttings.							

Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00187

BORING LOG T-5

SHEET 1 OF 1

SURFACE ELEV. - PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8/24/85 DATE COMPLETED 8/24/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Stiff, tan CLAY trace fine sand.	CL	41	1	DO	16-19-22	11/18	OVA= 0.5 ppm
6.5		Loose, tan, fine SAND some silt.	SM	9	2	DO	3-4-5	6/18	OVA= 2.7 ppm
		grading to,		4	3	DO	1-2-2	11/18	OVA= 0.4 ppm
		Very loose, tan fine to medium SAND trace silt.	SP	3	4	DO	1-2-1	12/18	OVA= 9.4 ppm
25.0		Boring Complete at 25.0 ft. Backfilled to surface with cuttings.							Note: OVA, refers to the reading on an organic vapor analyzer when applied to the sample.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00188

BORING LOG T-6

SHEET 1 OF 2

SURFACE ELEV. - PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8-28-85 DATE COMPLETED 8-28-85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Stiff CLAY trace fine sand.	CL						
10.0		Loose, tan fine SAND some silt.	SM	12	1	DO	4-6-6	18/18	
		grading to,		1	2	DO	1-0-1	6/18	
		Loose, tan, fine to coarse SAND trace silt.	SP	2	3	DO	3-1-1	0/18	
37.5		Continued on Sheet 2							

Job No. 853-3079

Scale 1"=5'

Golder Associates

Drawn SKB

Checked WBL

3 10 00189

BORING LOG T-6

SHEET 2 OF 2

FACE ELEV. - PROJECT SCDHEC/Bluff Rd/S.C.

DATUM MSL DATE STARTED 8-28-85 DATE COMPLETED 8-28-85

DRILL RIG CME 55 Mud Bug DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
37.5		Loose, tan, fine to coarse SAND trace silt.	SP						
				2	4	DO	1-1-1	12/18	
0.0		Stiff CLAY.	CH	50	5	DO	14-23-27	0/18	
51.5		Boring Complete at 51.5 ft. Backfilled with cuttings to surface.							

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn SKB
Checked WBL

3 10 00190

BORING LOG T-7

SHEET 1 OF 2

FACE ELEV. - PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/14/85 DATE COMPLETED 11/14/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Firm yellow gray to gray SILTY CLAY and fine sand	CL						
				30	1	DO	12-18-12	18/18	OVA = 0.5 ppm
				7	2	DO	7-3-4	18/18	OVA = 0.0 ppm
10.0		Loose light gray fine to coarse SAND, trace silt	SP						
				4	3	DO	5-3-1	---	OVA = 0.0 ppm
				5	4	DO	2-3-2	10/18	OVA = 0.1 ppm
				2	5	DO	2-1-1	10/18	OVA = 0.0 ppm
37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn LJW Checked AES

3 10 00191 **BORING LOG** T-7 SHEET 2 OF 2

SURFACE ELEV. — PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/14/85 DATE COMPLETED 11/14/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
37.5		Loose light gray fine to coarse SAND, trace silt	SP	--	6	DO	12/6"	6/6	OVA = 0.6 ppm
44.5		Stiff medium gray CLAY with healed orange fractures	CL	79	7	DO	12-19-50	18/18	OVA = 0.0 ppm
46.5		Boring terminated at 46.5'. Hole abandoned due to possible trace organics in sample #6. Hole backfilled with cuttings.							

Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn LJW Checked AES

3 10 00192

BORING LOG T-8

SHEET 1 OF 1

SURFACE ELEV. _____ PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/17/85 DATE COMPLETED 11/17/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Brown SILTY CLAY some fine sand	CL						Boring located 350' west of P-19
7.0		Red-brown fine SAND some silty clay moist at 14'	SC						
16.0		Red brown to gray fine to medium SAND, little silt	SP-SM						
				10	1	DO	6-5-5	18/18	OVA = 0.4 ppm
20.0		Boring terminated at 20.0' and backfilled with cuttings immediately after boring.							Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079
Scale 1"=5'

Golder Associates

Drawn AES
Checked AES

3 10 00193 **BORING LOG** T-9 SHEET 1 OF 1

SURFACE ELEV. — PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/17/85 DATE COMPLETED 11/17/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Gray SILTY CLAY some fine sand	CL						Boring location 150' west of P-19
3.0		Yellow brown SILTY CLAY and fine sand	CL						
8.0		Light yellow gray fine SAND some clayey silt	SM						
11.0		Moist light red brown to gray fine SAND some clayey silt	SM	12	1	DO	6-6-6	18/18	OVA = 0.2 ppm
				20	2	DO	9-10-10	12/18	OVA = 0.3 ppm
20.0		Boring terminated at 20.0' and backfilled with cuttings immediately after boring.							Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn AES Checked AES

3 10 00194 **BORING LOG** T-9 SHEET 1 OF 1

SURFACE ELEV. — PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/17/85 DATE COMPLETED 11/17/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Gray SILTY CLAY some fine sand	CL						Boring location 150' west of P-19
3.0		Yellow brown SILTY CLAY and fine sand	CL						
8.0		Light yellow gray fine SAND some clayey silt	SM						
11.0		Moist light red brown to gray fine SAND some clayey silt	SM	12	1	DO	6-6-6	18/18	OVA = 0.2 ppm
				20	2	DO	9-10-10	12/18	OVA = 0.3 ppm
20.0		Boring terminated at 20.0' and backfilled with cuttings immediately after boring.							Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn AES Checked AES

3 10 00195

BORING LOG T-10

SHEET 1 OF 1

SURFACE ELEV. - PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 11/21/85 DATE COMPLETED 11/21/85

DRILL RIG CME 550 DRILLING METHOD Hollow Stem Augers

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
0.0		Red brown SILTY CLAY some fine sand	CL						Boring located 300' northwest of P-20
2.5		Tan fine SAND and silty clay	SC						
15.0		Tan medium to coarse SAND, trace silt, trace fine gravel	SP	17	1	DO	10-8-9	18/18	OVA = 0.8 ppm
20.0		Boring terminated at 20.0' and backfilled with cuttings immediately after boring.							Note: OVA refers to the reading on an Organic Vapor Analyser when applied to the sample.

Job No. 853-3079

Scale 1"=5'

Golder Associates

Drawn AES

Checked AES

3 10 00196

BORING LOG 0-1

SHEET 1 OF 2

SURFACE ELEV. 138.6 PROJECT SCDHEC/Bluff Rd/SC

DATUM MSL DATE STARTED 12-16-85 DATE COMPLETED 12-17-85

DRILL RIG Davey DRILLING METHOD Rotary

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: HAMMER BLOWS PER 6 IN.	SAMPLES: REC./ATT.	REMARKS
0.0		Reddish brown CLAYEY SILT, some fine sand	ML						No samples taken. Boring logged from auger cuttings.
6.0		White slightly micaceous fine SAND, some silt	SM						
8.0		White fine to coarse SAND, trace silt	SP						
37.5		Continued on Sheet 2							

Job No. 853-3079

Scale 1"=5'

Golder Associates

Drawn MTF

Checked MTF

3 10 00197

BORING LOG 0-1

SHEET 2 OF 2

SURFACE ELEV. 138.6 PROJECT SCDHEC/Bluff Rd/SC

DATUM MSL DATE STARTED 12-16-85 DATE COMPLETED 12-17-85

DRILL RIG Davey DRILLING METHOD Rotary

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: HAMMER BLOWS PER 6 IN.	SAMPLES: REC./ATT.	REMARKS
37.5		White fine to coarse sand, trace silt	SP						
49.5		Black to gray CLAY	CL						
53.0		Boring terminated at 53.0 ft. See Monitoring Well Log for well details.							

Job No. 853-3079

Scale 1"=5'

Golder Associates

Drawn MTF

Checked MTF

3 10 00198

BORING LOG 0-2

SHEET 1 OF 2

SURFACE ELEV. 138.7 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 12/3/85 DATE COMPLETED 12/3/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: HAMMER BLOWS PER 6 IN.	SAMPLES: REC./ATT.	REMARKS
138.7 0.0		Orange brown SILTY CLAY and fine sand	CL						No samples taken. Boring logged from auger cuttings.
130.7 8.0		Yellow brown fine to medium SAND, little clayey silt	SP-SM						
123.7 15.0		Yellow-gray fine to coarse SAND, little silt	SP-SM						
101.2 37.5		Continued on Sheet 2							

Job No. 853-3079 Scale 1"=5'

Golder Associates

Drawn AES Checked AES

3 10 00199

BORING LOG 0-2

SHEET 2 OF 2

SURFACE ELEV. 138.7 PROJECT SCDHEC/Bluff Rd./SC

DATUM MSL DATE STARTED 12/3/85 DATE COMPLETED 12/3/85

DRILL RIG CME 55 DRILLING METHOD Hollow Stem Auger:

ELEV. / DEPTH	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS/FOOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES HAMMER BLOWS PER 6 IN.	SAMPLES REC./ATT.	REMARKS
101.2									
37.5		Yellow gray fine to coarse SAND, little silt	SP-SM						
88.6									
50.1		Stiff dark gray SILTY CLAY	CL						
86.1				--	1	TO	---	---	
52.6		Boring terminated at 52.6'. See Monitoring Well Log for well details							

Job No. 853-3079

Scale 1"=5'

Golder Associates

Drawn AES

Checked AES

3 10 00200

APPENDIX B

Monitoring Well Logs

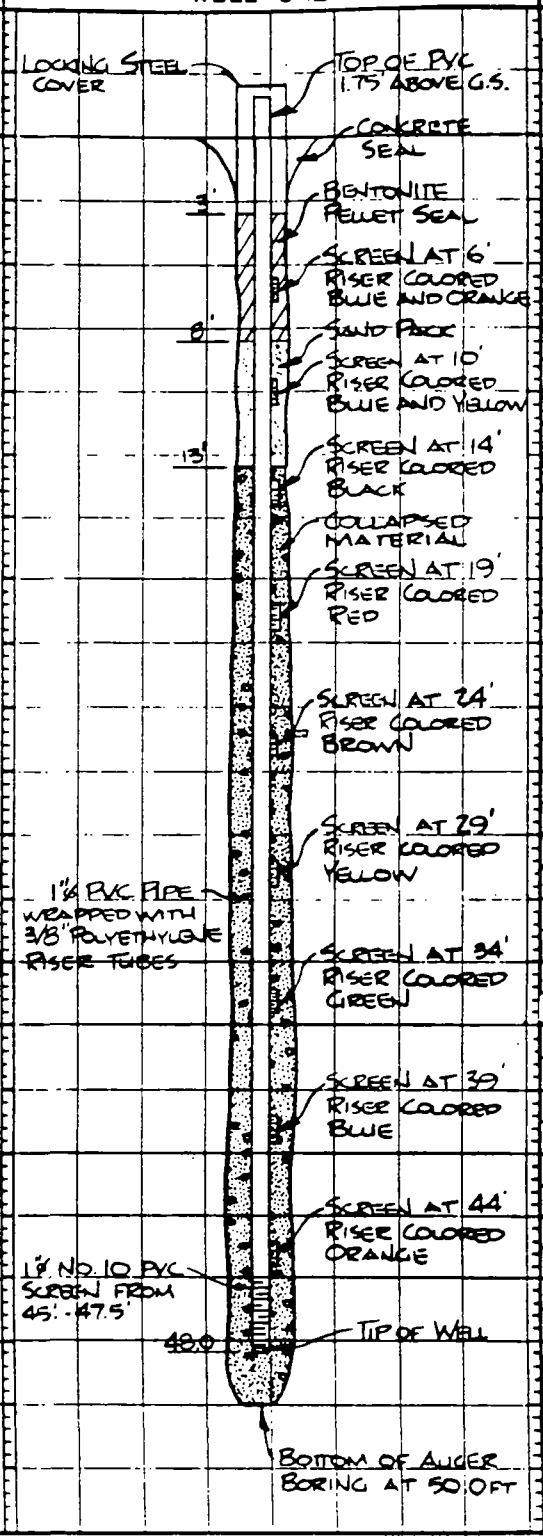
MONITORING WELL INSTALLATION LOG

JOB NO 853-3079	PROJECT SCDHEC / BLUFF RD / SC		WELL NO BP1	SHEET 1 of 1	
GA INSP AES	DRILLING METHOD HOLLOW STEM AUGERS		GROUND ELEV 138.3	WATER DEPTH —	
WEATHER FAIR	DRILLING COMPANY GEO CONSTRUCTION		COLLAR ELEV 140.09	DATE/TIME —	
TEMP 40's	DRILL RIG CME 55	DRILLER D JONES	STARTED 10:30 (TIME) 2/13/85 (DATE)	COMPLETED 10:30 (TIME) 2/13/85 (DATE)	

MATERIALS INVENTORY

WELL CASING SEE NOTES in. dia. SEE NOTES ft	WELL SCREEN SEE in. dia. NOTES ft	BENTONITE SEAL 50#
CASING TYPE SEE NOTES " "	SCREEN TYPE SEE NOTES " "	INSTALLATION METHOD POURED
JOINT TYPE —	SLOT SIZE —	FILTER PACK QTY 280#
GROUT QUANTITY —	CENTRALIZERS —	FILTER PACK TYPE QUIKRETE A.P SAND
GROUT TYPE —	DRILLING MUD TYPE —	INSTALLATION METHOD POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
138.3	GROUND SURFACE
0.0	GRAY TO GRAY-BROWN FINE TO MEDIUM SAND, LITTLE SILT (SP-SM)
133.3	
5.0	COMPACT BROWN AND TAN FINE SAND, SOME SILTY CLAY (SC)
124.3	
14.0	COMPACT TO LOOSE TAN FINE TO MEDIUM SAND, TO FINE TO COARSE SAND, LITTLE TO TRACE SILT, STRATA BECOMES CLEANER AND COARSER WITH DEPTH (SP-SM TO SP)
103.3	
35.0	LOOSE LIGHT GRAY TO BUFF FINE SAND LITTLE SILT (SP-SM)
90.8	
47.5	VERY STIFF LIGHT GRAY SILTY CLAY, TO BLACK PLASTIC CLAY SOME FINE SAND (CH)
88.3	
50.0	BOTTOM OF HOLE 50.0'



INSTALLATION NOTES

BUNDLE PIEZOMETER CONSISTS OF 1" SCH 40 FLUSH THREADED PVC PIPE (JOINTS TEFLON TAPED) TO WHICH ARE ATTACHED (WITH NYLON CABLE TIES) 3/8" I.D x 1/2" O.D. POLYETHYLENE TUBING. EACH TUBE WAS SCREENED WITH ~ 7" 3/8" O.D VYON POROUS POLYETHYLENE TUBING (PORE SIZE ≈ 0.050 mm) BUTTED INTO THE 1/2" TUBING AND TIPPED WITH RUGED END TUBING. EACH TUBE COLOR-CODED AT THE SURFACE WITH COLORED PLASTIC TAPE. THE BUNDLE WAS BUILT BEFORE INSTALLATION AND INSTALLED DOWN THE ANNULUS OF THE HOLLOW STEM AUGER, WITH JOINTS TEMPORARILY BRACED DURING INSTALLATION. THE FORMATION WAS ALLOWED TO COLLAPSE AS THE AUGERS WERE WITHDRAWN. THEN THE SANDPACK, BENTONITE SEAL, AND LOCKING COVER WERE INSTALLED.

WELL DEVELOPMENT NOTES

1. THE 1" CORE WAS DEVELOPED BY AIRLIFTING WITH NITROGEN. THE POLYETHYLENE TUBES COULD NOT BE PUMPED OR DEVELOPED USING THE PERISTALTIC PUMP, BUT WERE PARTIALLY DEVELOPED BY POSITIVE DISPLACEMENT.
2. "ORANGE" TIP CLOGGED DURING DEVELOPMENT
3. BLUE & ORANGE TIP BUNDED.

Golder Associates

3 10 00201

MONITORING WELL INSTALLATION LOG

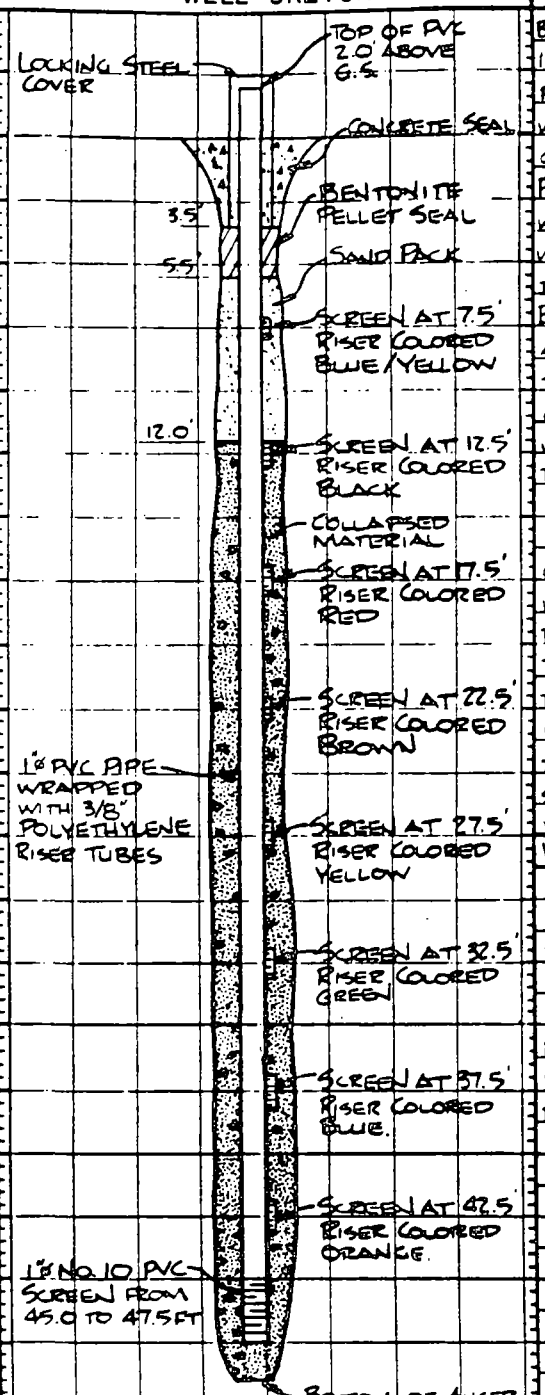
JOB NO 853-3079	PROJECT SCDHEC / Bluff Road / SC		WELL NO BP2	SHEET 1 OF 1	
GA INSP AES	DRILLING METHOD Hollow Stem Augers		GROUND ELEV 137.2	WATER DEPTH –	
WEATHER Fair	DRILLING COMPANY GEO-Construction		COLLAR ELEV 139.18	DATE/TIME –	
TEMP 50's	DRILL RIG CME 55	DRILLER D Jones	STARTED 8:30 (TIME) 2/15/85 (DATE)	COMPLETED 12:30 (TIME) 2/15/85 (DATE)	

MATERIALS INVENTORY

WELL CASING See Notes in dia. See Notes ft	WELL SCREEN See Notes in. dia. See Notes ft	BENTONITE SEAL 50 lb
CASING TYPE –	SCREEN TYPE –	INSTALLATION METHOD Poured
JOINT TYPE –	SLOT SIZE –	FILTER PACK QTY 350 lb
GROUT QUANTITY –	CENTRALIZERS –	FILTER PACK TYPE Builder's Sand
GROUT TYPE –	DRILLING MUD TYPE –	INSTALLATION METHOD Poured

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.2	GROUND SURFACE
0.0	LOOSE TO COMPACT BROWN FINE SAND AND SILTY CLAY (SC)
132.7	
5.0	COMPACT TAN TO BROWN FINE SAND, SOME SILT. (SM)
124.7	
12.5	LOOSE TAN FINE TO MEDIUM SAND, LITTLE SILT (SP-SM)
90.7	
46.5	VERY STIFF GRAY SILTY CLAY, LITTLE FINE SAND (CH)
88.2	
49.0	BOTTOM OF HOLE 49 FT.

WELL SKETCH



INSTALLATION NOTES

Bundle Piezometer consists of 1" Sch 40 flush threaded PVC pipe (joints Teflon taped) to which are attached (with nylon cable ties) 3/8" I.D. x 1/2" O.D Polyethylene tubing. Each tube was screened with ~7" 3/8" O.D Non Porous Polyethylene tubing (Pore size = 0.050 mm) Butted into the 1/2" tubing and tipped with fused-end tubing. Each tube color-coded at the surface with colored plastic tape. The bundle was built before installation and installed down the annulus of the hollow stem auger with joints temporarily braced during installation. The formation was allowed to collapse as the augers were withdrawn, then the sandpack, bentonite seal, and locking cover were installed.

WELL DEVELOPMENT NOTES

The 1" core was developed by airlifting with Nitrogen. The Polyethylene tubes could not be pumped or developed using the peristaltic pump, but were partially developed by positive displacement.

3 10 00202

MONITORING WELL INSTALLATION LOG

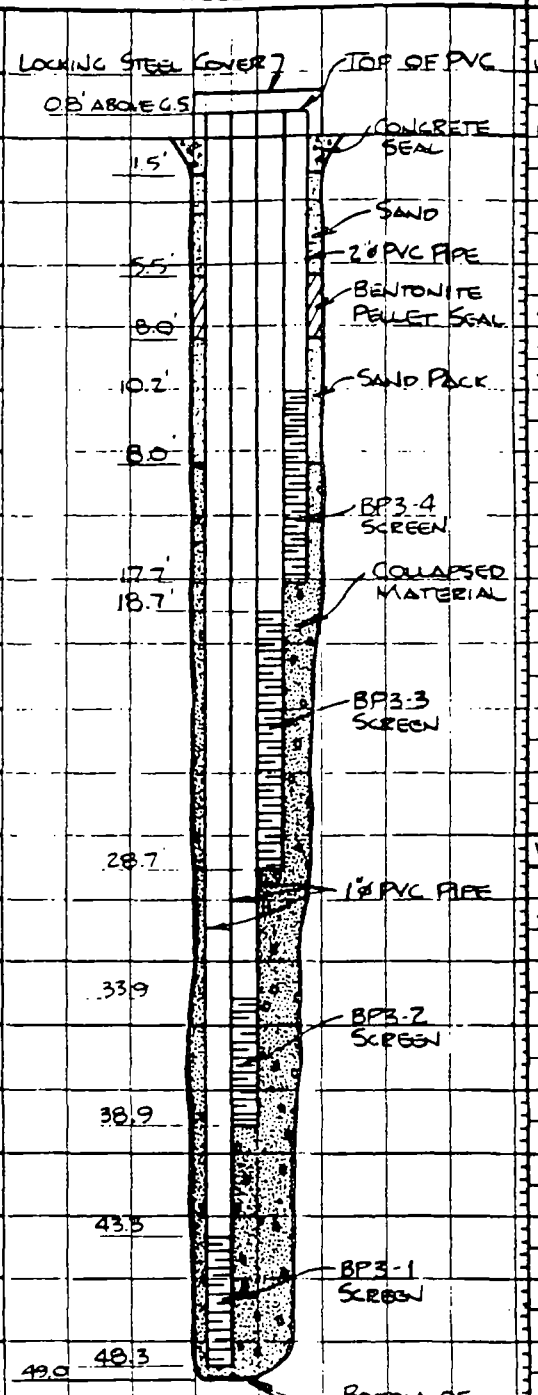
JOB NO. 853-3079	PROJECT SCDHEC / BLUFF ROAD / SC	WELL NO BP3	SHEET 1 OF 1
GA INSP AES	DRILLING METHOD HOLLOW STEM AUGERS	GROUND ELEV 137.5	WATER DEPTH —
WEATHER FAIR	DRILLING COMPANY GEOTEC	COLLAR ELEV 138.35	DATE/TIME —
TEMP. 80's	DRILL RIG CME 55	DRILLER RICK	STARTED 11:00 (TIME) / 4/19/85 (DATE)
			COMPLETED 3:15 (TIME) / 4/15/85 (DATE)

MATERIALS INVENTORY

WELL CASING 1" AND 2" in dia SEE NOTES 1.1	WELL SCREEN 1" AND 2" in. dia. SEE NOTES 1.1	BENTONITE SEAL 50#
CASING TYPE SCH 40 PVC	SCREEN TYPE 0.010" MILLED SLOTS	INSTALLATION METHOD POURED
JOINT TYPE FLUSH THREADED, TEFLON TAPED	FILTER FABRIC WRAPPED	FILTER PACK QTY 250#, 8'-15'
GROUT QUANTITY —	CENTRALIZERS —	FILTER PACK TYPE DIXIANA B-35 SAND
GROUT TYPE —	DRILLING MUD TYPE —	INSTALLATION METHOD POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.5	GROUND SURFACE
0.0	BROWN FINE SAND, SOME SILT (SM)
135.0	
2.5'	BROWN FINE TO MEDIUM SAND, SOME CLAYEY SILT (SC)
127.5	
10.0'	TAN FINE TO MEDIUM SAND, SOME SILT (SP)
122.5	
15.0'	TAN TO BUFF FINE TO MEDIUM SAND, TRACE SILT. (SP)
90.1	
47.4'	FIRM GRAY CLAY, SOME FINE SAND (CH)
88.5	
49.0	BOTTOM OF HOLE 49.0 FT.

WELL SKETCH



INSTALLATION NOTES

BP3-1, BP3-2, AND BP3-3 WERE CONSTRUCTED OF 1" PVC PIPE AND WERE INSTALLED THROUGH THE ANNULUS OF A HOLLOW STEM AUGER. BP3-4 WAS INSTALLED AFTER THE AUGERS WERE WITHDRAWN AND WAS DRIVEN BY HAND FOR ABOUT THE FINAL TWO FEET. BP3-4 WAS CONSTRUCTED OF 2" PVC PIPE.

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE

WELL DEVELOPMENT NOTES

ALL WELLS DEVELOPED BY INTERMITTENT AIRLIFTING A 1" EDUCTOR PIPE WAS USED INSIDE BP3-4. EACH WELL WAS PUMPED ABOUT 20 MINUTES AT 3 GPM (ESTIMATED). AIRLIFTING WAS PERFORMED AFTER CONSTRUCTION AND AGAIN BEFORE INITIAL SAMPLING

3 10 00203

MONITORING WELL INSTALLATION LOG

JOB NO 853-3079 PROJECT SCDHEC / BLUFF RD / SC WELL NO BP-4 SHEET 1 OF 1
GA INSP AES DRILLING METHOD HOLLOW STEM AUGERS GROUND ELEV 134.9 WATER DEPTH —
WEATHER SUNNY DRILLING COMPANY GEOTEC COLLAR ELEV. 135.90 DATE/TIME —
TEMP 80's DRILL RIG CME 55 DRILLER RICK STARTED 1:30 / 4/18/85 COMPLETED 3:30 / 4/18/85
(TIME / DATE)

3 10 00204

MATERIALS INVENTORY

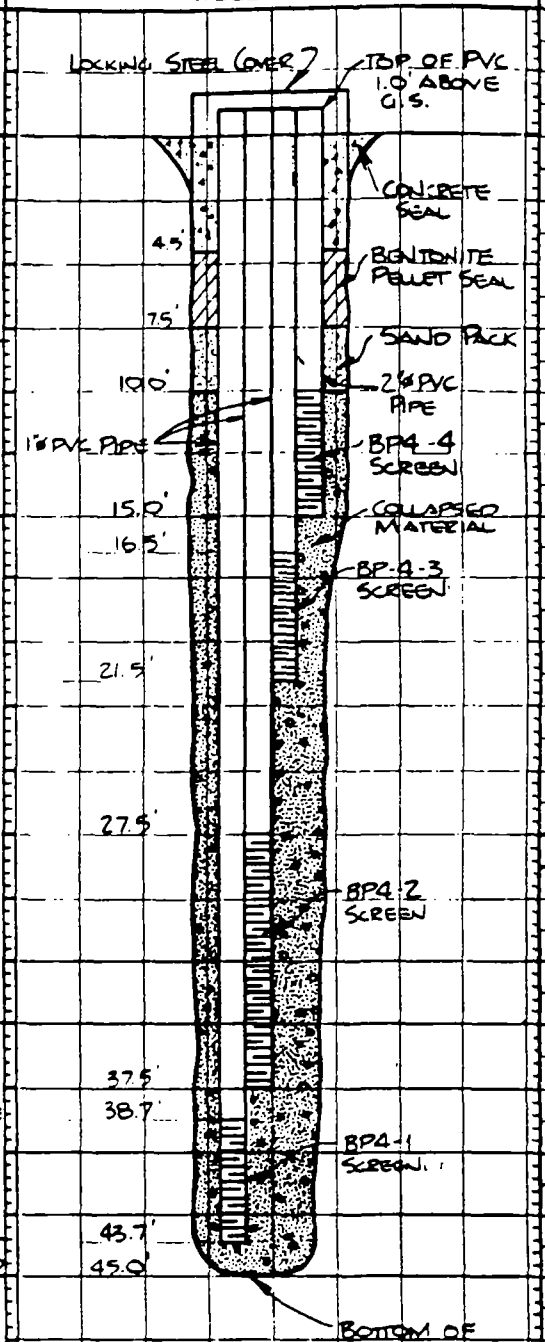
WELL CASING 1" AND 2" in. dia. SEE NOTES l.f
CASING TYPE SCH 40 PVC
JOINT TYPE FLUSH THREADED TEFLON TAPED
GROUT QUANTITY —
GROUT TYPE —

WELL SCREEN 1" AND 2" in. dia. SEE NOTES l.f
SCREEN TYPE 0.010" MILLED SLOT
SCREEN FILTER FABRIC WRAPPED
CENTRALIZERS —
DRILLING MUD TYPE —

BENTONITE SEAL 100#
INSTALLATION METHOD POURED
FILTER PACK QTY 150#
FILTER PACK TYPE FOSTER DIXIANA 8-35 SAND
INSTALLATION METHOD POURED

ELEV / DEPTH	SOIL / ROCK DESCRIPTION
134.9	GROUND SURFACE
0.0	BROWN AND LIGHT GRAY FINE SAND AND SILTY CLAY (SC)
126.9	
8.0	GRAY FINE TO COARSE SAND, LITTLE TO SOME SILT. (SM)
119.9	
15.0	TAN AND BUFF FINE TO COARSE SAND, TRACE FINE GRAVEL, TRACE SILT (SP)
99.9	
35.0	LIGHT BROWN FINE TO MEDIUM SAND, LITTLE SILT, TRACE FINE GRAVEL. (SP-SM)
91.4	VERY HARD BLACK CLAY SOME
43.5	COARSE TO MEDIUM SAND
89.9	
45.0	BOTTOM OF HOLE 45 FT.

WELL SKETCH



INSTALLATION NOTES

BP4-1, BP4-2, AND BP4-3 WERE CONSTRUCTED OF 1" PVC AND WERE INSTALLED DOWN THE ANNULUS OF A HOLLOW-STEM AUGER BP5-4 WAS CONSTRUCTED OF 2" PVC AND WAS INSTALLED AFTER THE AUGERS WERE WITHDRAWN.

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

WELL DEVELOPMENT NOTES

ALL WELLS DEVELOPED BY INTERMITTENT AIR LIFTING. A 1" EDUCTOR PIPE WAS USED INSIDE BP3-4. AIRLIFTING WAS PERFORMED AFTER INSTALLATION AND AGAIN BEFORE INITIAL SAMPLING. FLOW AND TIMES OF DEVELOPMENT WERE

#	FLOW (GPM)	TIME (MIN)
1	1.5	20
2	0.5	60
3	0.5	60
4	1	30

MONITORING WELL INSTALLATION LOG

3 10 00205

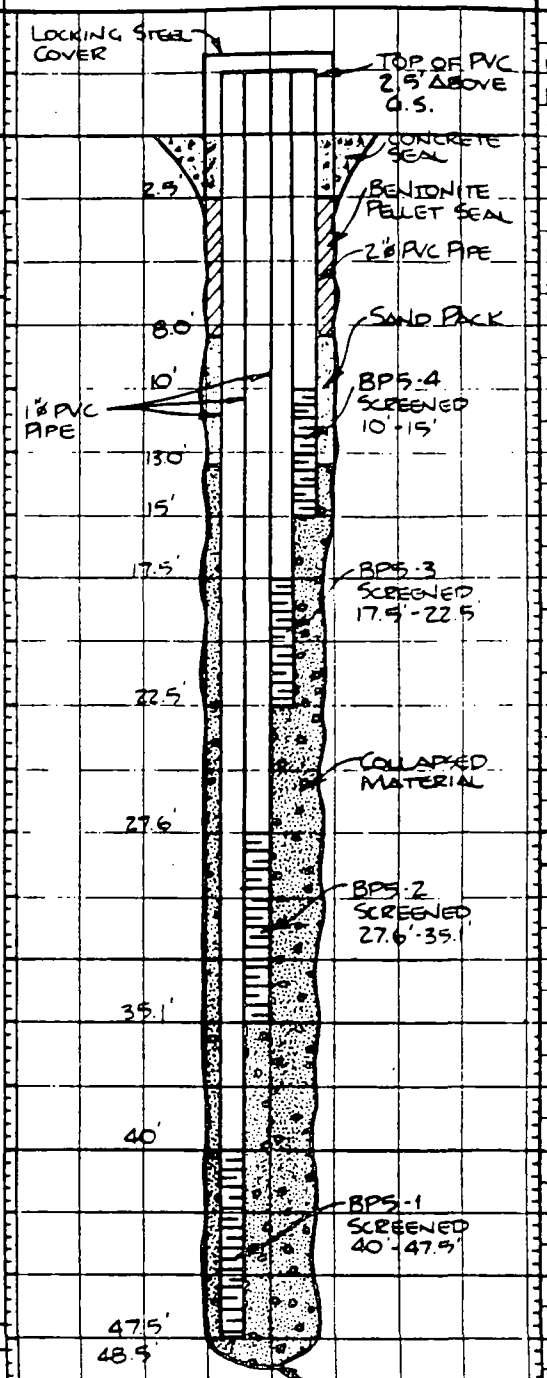
JOB NO 883-3179	PROJECT SCDHEC / BLUFF RD / SC	WELL NO BPS	SHEET 1 of 1
GA INSP AES	DRILLING METHOD HOLLOW STEM AUGERS	GROUND ELEV 137.7	WATER DEPTH –
WEATHER FAIR	DRILLING COMPANY GEOTEC	COLLAR ELEV 140.2	DATE/TIME –
TEMP 80's	DRILL RIG CME 55	DRILLER RICK	STARTED 10:00 / 4/22/93 (TIME / DATE) COMPLETED 1:30 / 4/22/93 (TIME / DATE)

MATERIALS INVENTORY

WELL CASING 1" AND 2" in. dia. NOTES 11	WELL SCREEN 1" AND 2" in. dia. NOTES 11	BENTONITE SEAL #8 & 25'-F
CASING TYPE SCH 40 PVC	SCREEN TYPE 0.010" MILLED SLOT	INSTALLATION METHOD POURED
JOINT TYPE FLUSH THREADED, TEFLON TAPED FILTER FABRIC WRAPPED		FILTER PACK QTY 300#, 13'-8'
GROUT QUANTITY –	CENTRALIZERS –	FILTER PACK TYPE CHEROKEE #1 HS SAND
GROUT TYPE –	DRILLING MUD TYPE –	INSTALLATION METHOD POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.7	GROUND SURFACE
0.0	BROWN FINE SAND AND SILT (SM)
134.7	
3.0	BROWN FINE TO MEDIUM SAND, SOME SILT (SM)
131.3	
6.4	TAN TO BUFF FINE TO MEDIUM, SAND, TRACE SILT (SP)
90.7	
47.0	VERY SILTY FINE STIFF GRAY CLAY, SOME SAND (CH)
48.5	BOTTOM OF HOLE 48.5'

WELL SKETCH



INSTALLATION NOTES

BPS-1, BPS-2, AND BPS-3 WERE CONSTRUCTED OF 1" PVC PIPE AND WERE INSTALLED THROUGH THE ANNULUS OF A HOLLOW STEM AUGER. BPS-4 WAS CONSTRUCTED OF 2" PVC PIPE AND WAS INSTALLED AFTER THE AUGERS WERE WITHDRAWN. THE FORMATION COLLAPSED TO 13'. THE ANNULUS WAS FILLED WITH WASHED SAND TO 2' ABOVE THE SCREEN. THE BENTONITE SEAL WAS THEN PLACED AND ALLOWED TO HYDRATE OVERNIGHT BEFORE THE LOCKING COVER WAS INSTALLED.

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

WELL DEVELOPMENT NOTES

ALL WELLS DEVELOPED BY INTERMITENT AIRLIFTING. A 1" EDUCTOR PIPE WAS USED INSIDE BPS-4. EACH WELL WAS PUMPED APPROX. 20 MINUTES AT 3/4-1 1/2 GPM (ESTIMATED). AIRLIFTING WAS PERFORMED AFTER CONSTRUCTION AND AGAIN BEFORE INITIAL SAMPLING.

MONITORING WELL INSTALLATION LOG

JOB NO 853-3079 PROJECT SCDHEC/BLUFF ROAD/SC WELL NO P-6 SHEET 1 OF 1
GA INSP WBL/MTF DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV 140.2 WATER DEPTH 9.7'
WEATHER CLEAR DRILLING COMPANY TRI-STATE COLLAR ELEV 143.08 DATE/TIME 8/13/85 6:20P
TEMP 90° F DRILL RIG CME-45 DRILLER DJ/RJ STARTED 5:00pm/8/13/85 COMPLETED 6:20p/8/14/85
TIME / DATE TIME / DATE

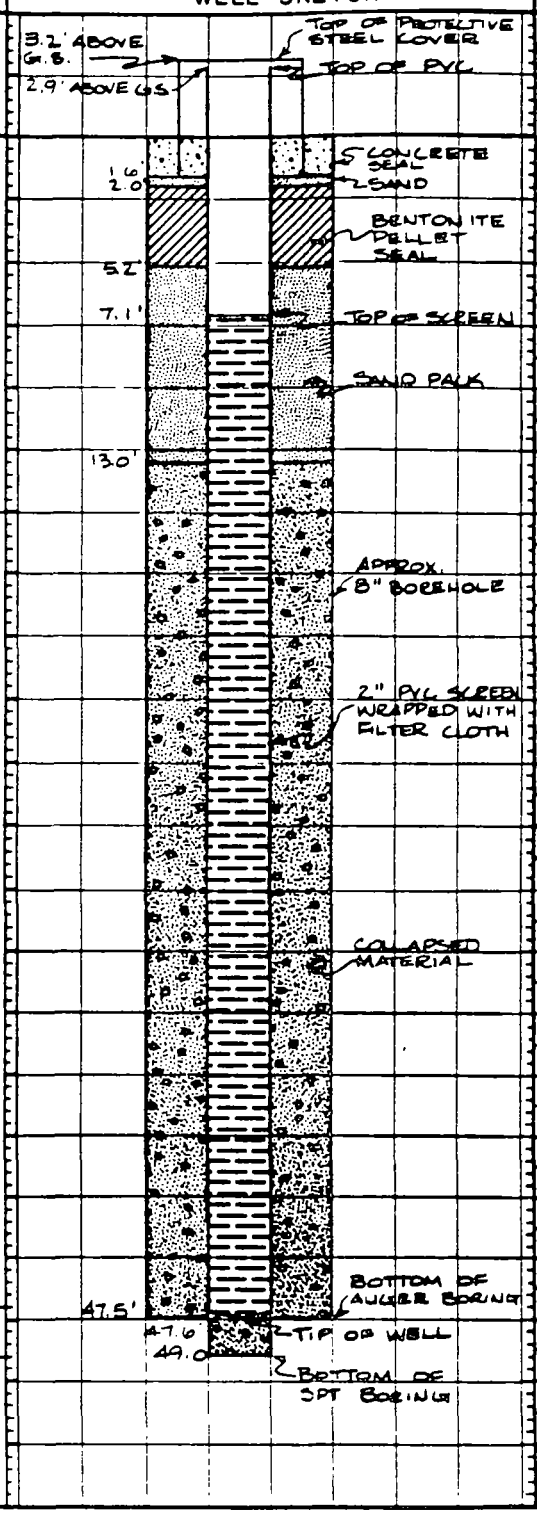
3 10 00206

MATERIALS INVENTORY

WELL CASING 2" in. dia. 10.0 l.f.	WELL SCREEN 2" in. dia. 40.0 l.f.	BENTONITE SEAL 3.2 FEET
CASING TYPE SCH 40 PVC	SCREEN TYPE SLOTTED PVC	INSTALLATION METHOD HAND POURED
JOINT TYPE FLUSH THREADED TRI-LOK	SLOT SIZE .010 INCH	FILTER PACK QTY 7.8 FEET
GROUT QUANTITY —	CENTRALIZERS —	FILTER PACK TYPE CHEROKEE #413 SAND
GROUT TYPE —	DRILLING MUD TYPE —	INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
140.2	GROUND SURFACE
0.0	COMPACT, REDDISH BROWN, FINE SAND SOME SILTY CLAY (SM)
125.2	
15.0	VERY LOOSE, TAN FINE SAND LITTLE SILT, (SP-SM)
	GRADING TO,
	COMPACT, TAN FINE TO MEDIUM SAND TRACE SILT (SP)
93.2	
47.0	HARD, WHITE AND BROWN CLAY TRACE FINE TO MEDIUM SAND (CH)
91.2	
49.0	BOTTOM OF HOLE 49 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 40.0' SCREEN
10.0' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 13.0'.

PLACED SAND PACK TO 5.2'
PLACED BENTONITE SEAL TO 2.0'
PLACED SAND TO 1.6'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

8/14/85 - BAILED 10 GALLONS

9/3/85 - HAND PUMPED 130 GALLONS SURGED THE WELL SCREEN THROUGHOUT AND PUMPED 75 GALLONS.

MONITORING WELL INSTALLATION LOG

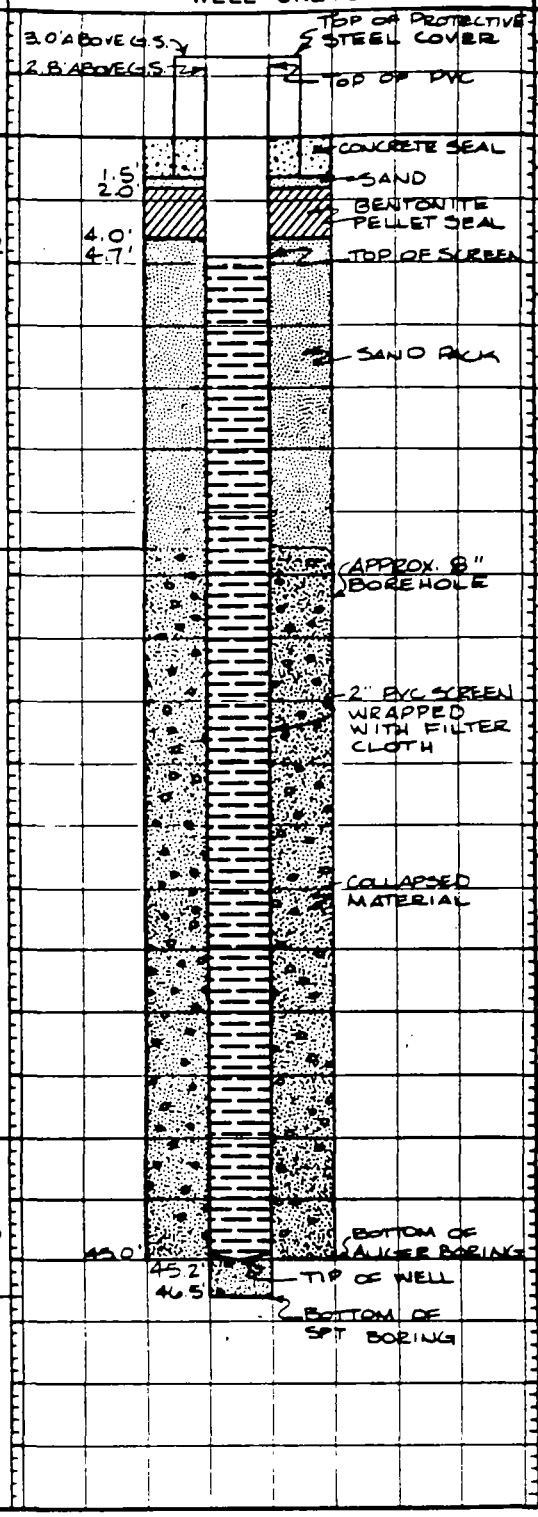
JOB NO 853-3079 PROJECT SCDHEC/BLUFF RD/SC. WELL NO P-7 SHEET 1 OF 1
GA INSP WBL/MTF DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV 139.9 WATER DEPTH 11.2
WEATHER CLEAR DRILLING COMPANY TRI-STATE COLLAR ELEV 142.70 DATE/TIME 8/14/85 1100hr
TEMP 90° F DRILL RIG CME-45 DRILLER DJ/RJ STARTED 12:00 pm/8/14/85 COMPLETED 1100 pm 8/14/85
(TIME / DATE) (TIME / DATE)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 7.5 l.f. WELL SCREEN 2 in. dia. 40 l.f. BENTONITE SEAL 2 FEET
CASING TYPE SCH 40 PVC SCREEN TYPE SLOTTED PVC INSTALLATION METHOD HAND POURED
JOINT TYPE FLUSH THREAD TRI-LOC SLOT SIZE .010 INCH FILTER PACK QTY 11 FEET
GROUT QUANTITY — CENTRALIZERS — FILTER PACK TYPE CHEROKEE FAIS SAND
GROUT TYPE — DRILLING MUD TYPE — INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
139.9	GROUND SURFACE
0.0	COMPACT, REDDISH BROWN FINE SAND SOME CLAYEY SILT. (SM)
123.4	
16.5	COMPACT, TAN FINE TO MEDIUM SAND TRACE SILT (SP)
99.9	
40.0	VERY STIFF, GRAY AND BROWN CLAY LITTLE FINE SAND (CH)
93.4	
46.5	BOTTOM OF HOLE AT 46.5'

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 40.0' SCREEN
7.5' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 15.0'

PLACED SAND PACK TO 4.0'
PLACED BENTONITE SEAL TO 2.0'
PLACED SAND TO 1.5'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

9/4/85 - SURGED THE WELL SCREEN THROUGHOUT, HAND PUMPED 50 GALLONS. REPEATED THE PROCEDURE OF SURGING AND PUMPING 20 GALLONS (4 REPETITIONS)

3 10 00207

MONITORING WELL INSTALLATION LOG

JOB NO 8533079 PROJECT SCDHEC/BLUFF RD./S.C. WELL NO P-8 SHEET 1 OF 1
GA INSP WBL/MTF DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV 138.8 WATER DEPTH 10.1
WEATHER CLEAR DRILLING COMPANY TRI-STATE COLLAR ELEV 141.25 DATE/TIME 8/20/85 3:45pm
TEMP 90° F DRILL RIG CME 55 DRILLER DJ/RJ STARTED 4:30pm/8/20/85 COMPLETED 1:30pm 8/21/85
TIME / DATE TIME / DATE

MATERIALS INVENTORY

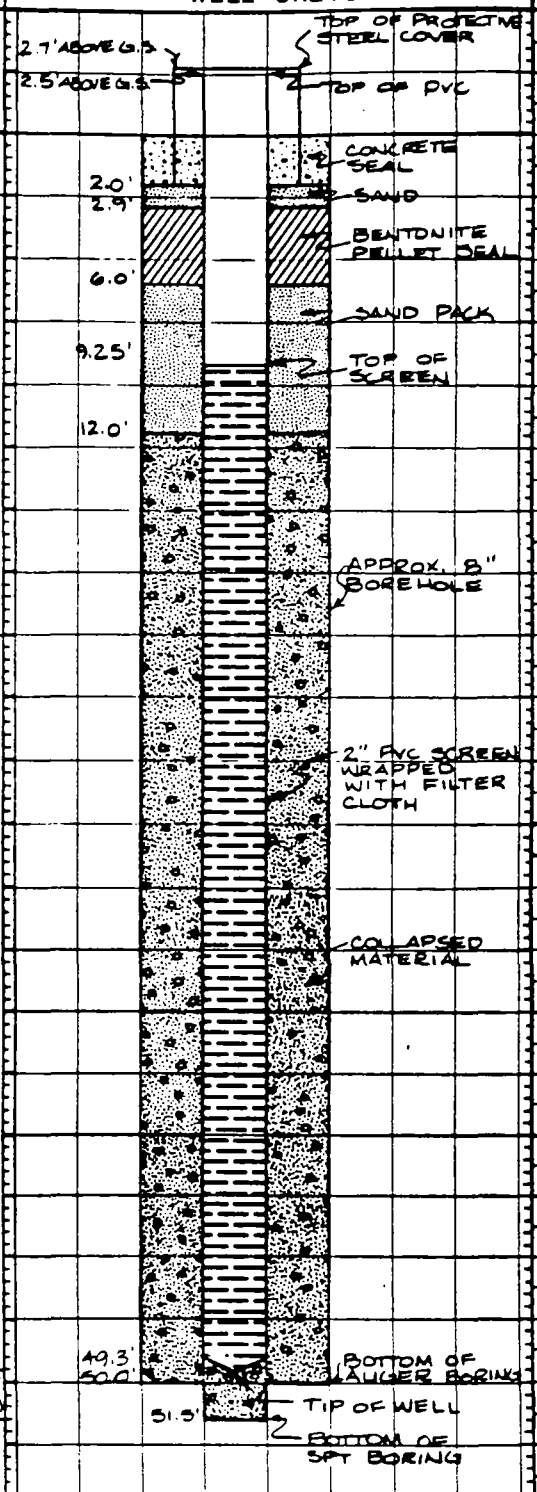
WELL CASING 2 in. dia. 11.8 ft
CASING TYPE SCH 40 PVC
JOINT TYPE FLUSH THREAD TRI-LOC
GROUT QUANTITY –
GROUT TYPE –

WELL SCREEN 2 in. dia. 40 ft
SCREEN TYPE SLOTTED PVC
SLOT SIZE .010 INCH
CENTRALIZERS –
DRILLING MUD TYPE –

BENTONITE SEAL 3.1 FEET
INSTALLATION METHOD HAND POURED
FILTER PACK QTY 6 FEET
FILTER PACK TYPE CHEROKEE FA13 SAND
INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
138.8	GROUND SURFACE
0.0	
136.3	GRAVEL FILL
2.5	
	COMPACT, TAN FINE TO MEDIUM SAND TRACE TO LITTLE SILT (SP-SM)
118.8	
20.0	
	COMPACT TO LOOSE, TAN FINE TO MEDIUM SAND TRACE SILT (SP)
89.3	
49.5	STIFF, BLACK TO DARK GRAY CLAY LITTLE FINE TO MEDIUM SAND (CH)
87.3	
51.5	BOTTOM OF HOLE AT 51.5'

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 40.0' SCREEN
11.8' CASING
0.5' WELL POINT
AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 12.0'

PLACED SAND PACK TO 6.0'
PLACED BENTONITE SEAL TO 2.9'
PLACED SAND TO 2.0'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

9/5/85 - SURGED THE WELL SCREEN THROUGHOUT, HAND PUMPED 30 GALLONS, SURGED BOTTOM 20 FEET, PUMPED 20 GALLONS, SURGED BOTTOM 20 FEET PUMPED 20 GALLONS. SURGED TOP 20 FEET, PUMPED 20 GALLONS. SURGED TOP 20 FEET, PUMPED 20 GALLONS.

3 10 00208

Golder Associates

MONITORING WELL INSTALLATION LOG

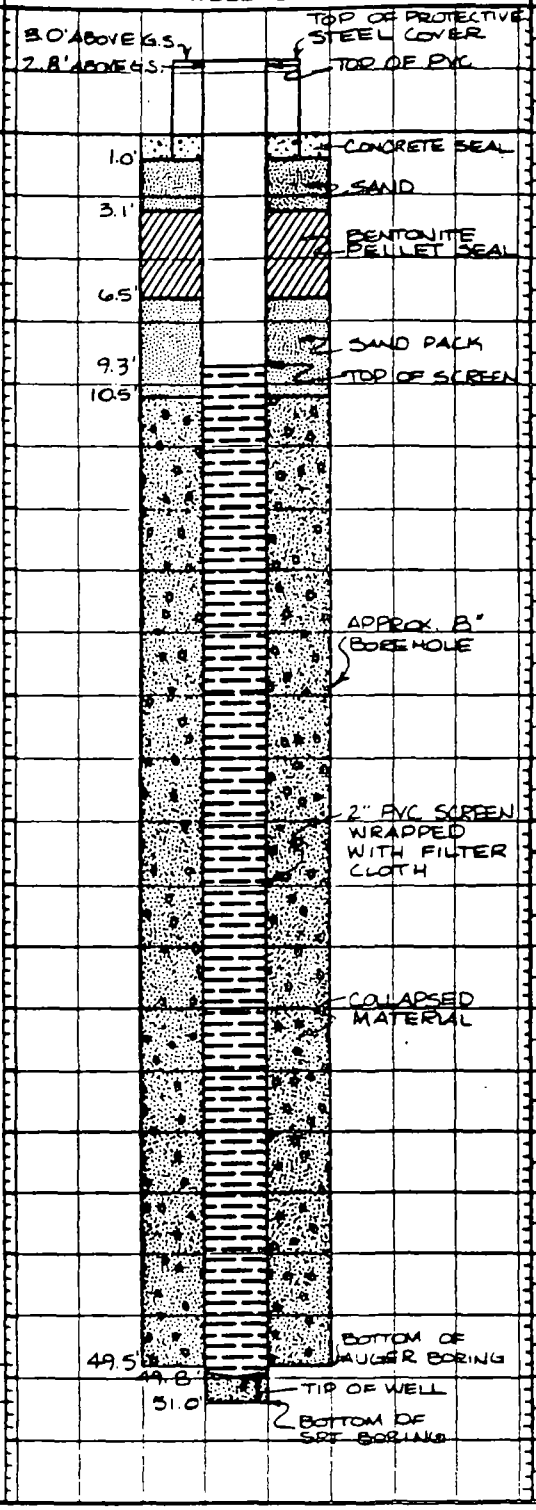
JOB NO 853-3021	PROJECT SCDHEC/BLUFF RD/S.C.	WELL NO P-9	SHEET 1 OF 1
GA INSP VIB/MTE	DRILLING METHOD HOLLOW STEM AUGER	GROUND ELEV 138.5	WATER DEPTH 9.7'
WEATHER RAINING	DRILLING COMPANY TRI-STATE	COLLAR ELEV 141.32	DATE/TIME 8/21/85 5:00pm
TEMP 75° F	DRILL RIG CME 55	DRILLER DD/RJ	STARTED 3:00 pm/8/21/85 (TIME / DATE) COMPLETED 4:50 pm/8/21/85 (TIME / DATE)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 12.1 l.f.	WELL SCREEN 2 in. dia. 40 l.f.	BENTONITE SEAL 3.4 FEET
CASING TYPE SCH 40 PVC	SCREEN TYPE SLOTTED PVC	INSTALLATION METHOD HAND POURED
JOINT TYPE FLUSH THREAD TRI-LOC	SLOT SIZE .010 INCH	FILTER PACK QTY 4.0 FEET
GROUT QUANTITY —	CENTRALIZERS —	FILTER PACK TYPE CHEROKEE FALLS SAND
GROUT TYPE —	DRILLING MUD TYPE —	INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
138.5	GROUND SURFACE
0.0	HARD, LIGHT BROWN SILT SOME FINE SAND (ML)
132.5	
6.0	LOOSE, TAN FINE SAND LITTLE SILT (SP-SM)
119.0	
19.5	LOOSE, TAN FINE SAND, TRACE SILT (SP)
89.0	
49.5	STIFF, GRAY CLAY TRACE FINE SAND (CH)
87.5	
51.0	BOTTOM OF HOLE AT 51.0 FT

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 40.0' SCREEN
12.1' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 10.5'.

PLACED SAND PACK TO 6.5'
PLACED BENTONITE SEAL TO 3.1'
PLACED SAND TO 1.0'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE

WELL DEVELOPMENT NOTES

8/23/85 - BAILED 22 GALLONS.

9/5/85 - SURGED WELL SCREEN THROUGHOUT, PUMPED 30 GALLONS. SURGED BOTTOM 20 FEET, PUMPED 20 GALLONS. SURGED TOP 20 FEET, PUMPED 30 GALLONS.

3 10 00209

MONITORING WELL INSTALLATION LOG

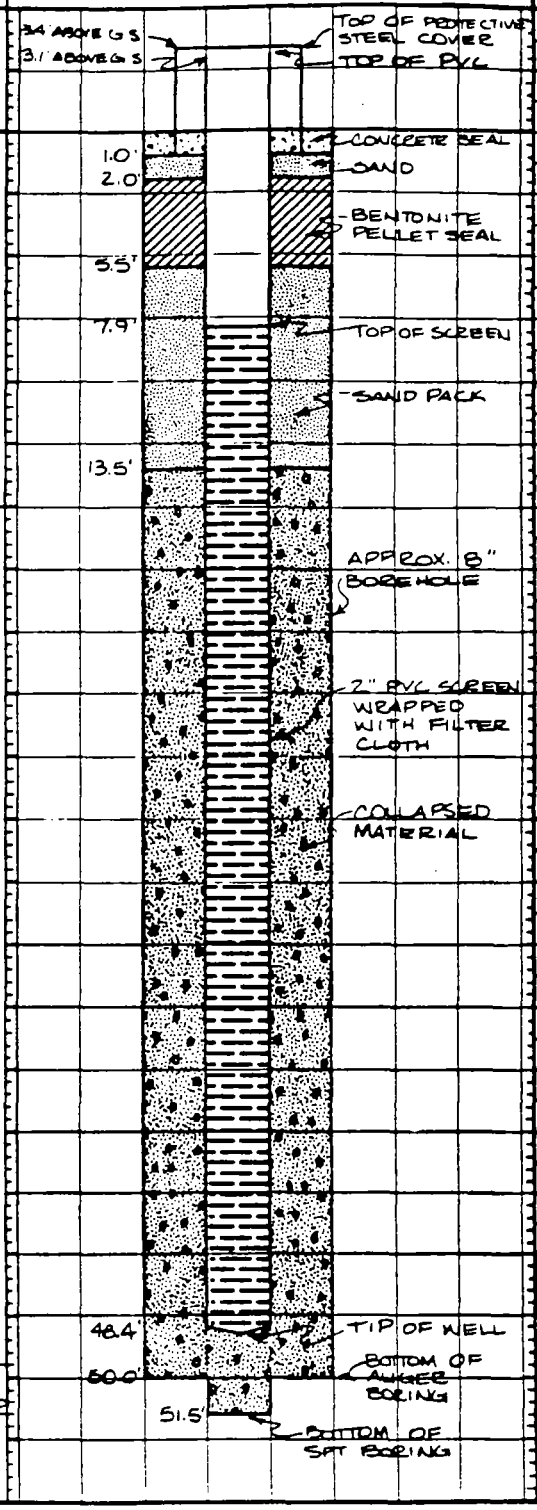
JOB NO 253-3079 PROJECT SCDHEC/BLUFF RD/S.C WELL NO P-10 SHEET 1 OF 1
GA INSP WBL/FWS DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV. 139.2 WATER DEPTH 10.9'
WEATHER CLEAR DRILLING COMPANY TRI-STATE COLLAR ELEV 142.30 DATE/TIME 9/15/85 9:30
TEMP 90°F DRILL RIG CME 55 DRILLER DJ/RJ STARTED 6:00 PM/8/22/85 COMPLETED 9:30 AM/9/3/85
TIME / DATE TIME / DATE

MATERIALS INVENTORY

WELL CASING 2 in. dia. 11.0 l.f. WELL SCREEN 2 in. dia. 40 l.f. BENTONITE SEAL 3.5 FEET
CASING TYPE SCH 40 PVC SCREEN TYPE SLOTTED PVC INSTALLATION METHOD HAND POURED
JOINT TYPE FLUSH THREAD TRI-LOC SLOT SIZE .010 INCH FILTER PACK QTY 6.0 FEET
GROUT QUANTITY — CENTRALIZERS — FILTER PACK TYPE CHEROKEE #13 SAND
GROUT TYPE — DRILLING MUD TYPE — INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
139.2	GROUND SURFACE
0.0	STIFF, LIGHT BROWN AND GRAY CLAY, TRACE FINE SAND (CL)
124.2	
15.0	LOOSE TO COMPACT, TAN FINE TO MEDIUM SAND TRACE SILT (SP)
89.7	
49.5	FIRM, DARK GRAY CLAY
87.7	TRACE FINE TO MEDIUM SAND
51.5	(CH)
	BOTTOM OF HOLE AT 51.5'

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOL TO USE

INSTALLED 40.0' SCREEN
11.0' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 13.5'

PLACED SAND PACK TO 5.5'
PLACED BENTONITE SEAL TO 2.0'
PLACED SAND TO 1.0'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

9/5/85 - SURGED WELL SCREEN THROUGHOUT.
PUMPED 30 GALLONS.
SURGED BOTTOM 20 FEET.
PUMPED 20 GALLONS.
SURGED TOP 20 FEET.
PUMPED 30 GALLONS.

Golder Associates

3 10 00210

MONITORING WELL INSTALLATION LOG

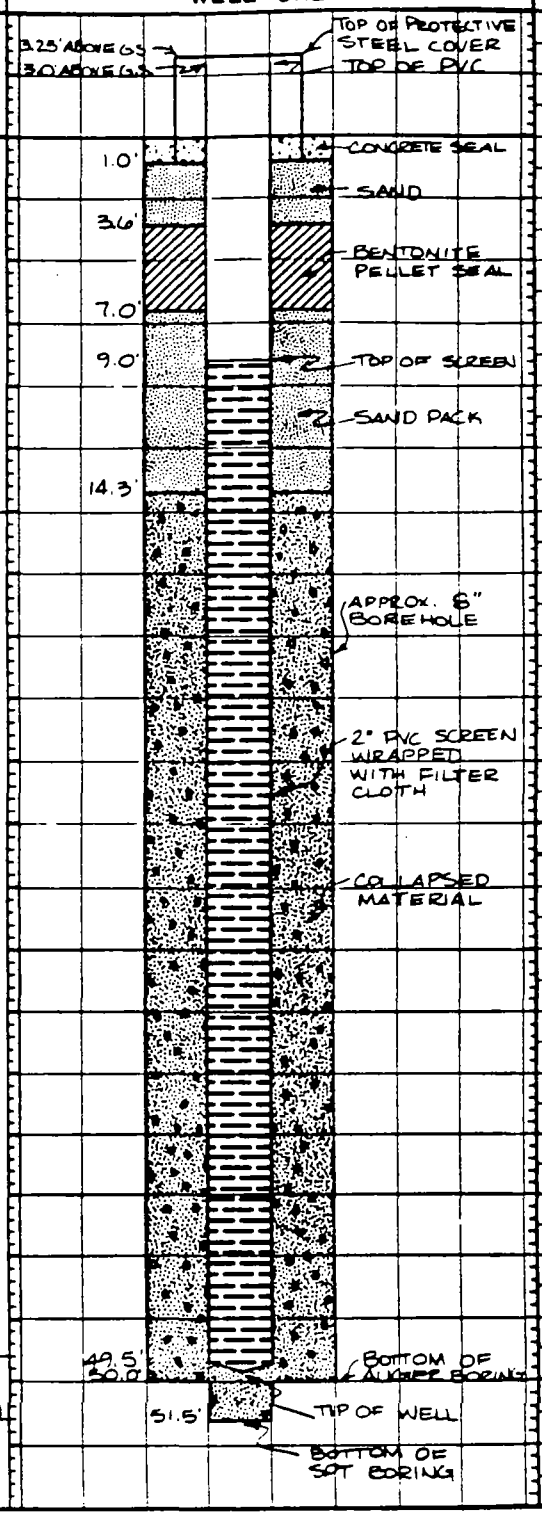
JOB NO 852-5078 PROJECT SCUHEC / BLUFF RD / S.C. WELL NO P-11 SHEET 1 OF 1
GA INSP WB / PWS DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV 137.9 WATER DEPTH 9.5'
WEATHER CLEAR DRILLING COMPANY TRI-STATE COLLAR ELEV 140.87 DATE/TIME 8/24/85 11:00 AM
TEMP. 75° F DRILL RIG CME 55 DRILLER DJ/RJ STARTED 9:30 AM 8/24/85 COMPLETED 11:00 AM 8/24/85
TIME / DATE TIME / DATE

MATERIALS INVENTORY

WELL CASING	2 in. dia 12.0 Lf	WELL SCREEN	2 in. dia 40 Lf	BENTONITE SEAL	3.4 FEET
CASING TYPE	SCH 40 PVC	SCREEN TYPE	SLOTTED PVC	INSTALLATION METHOD	HAND POURED
JOINT TYPE	FLUSH THREAD TRI-LOC	SLOT SIZE	.010 INCH	FILTER PACK QTY	7.3 FEET
GROUT QUANTITY	—	CENTRALIZERS	—	FILTER PACK TYPE	CHEROKEE #13 SAND
GROUT TYPE	—	DRILLING MUD TYPE	—	INSTALLATION METHOD	HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.9	GROUND SURFACE
0.0	STIFF, LIGHT BROWN TO REDDISH BROWN CLAY, TRACE FINE SAND (CL)
122.9	
15.0	LOOSE TO COMPACT, TAN FINE TO MEDIUM SAND LITTLE GRADING TO TRACE SILT (SP)
88.9	
49.0	STIFF, BLACK CLAY TRACE FINE TO MEDIUM SAND (CH)
86.4	
51.5	BOTTOM OF HOLE AT 51.5 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE

INSTALLED: 40.0' SCREEN
12.0' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 14.3'.

PLACED SAND PACK TO 7.0'

PLACED BENTONITE SEAL TO 3.6'

PLACED SAND TO 1.0'

SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

9/5/85 - SURGED WELL SCREEN THROUGHOUT. PUMPED 30 GALLONS. SURGED BOTTOM 20 FEET. PUMPED 20 GALLONS. SURGED TOP 20 FEET. PUMPED 30 GALLONS.

Golder Associates

3-10-0211

MONITORING WELL INSTALLATION LOG

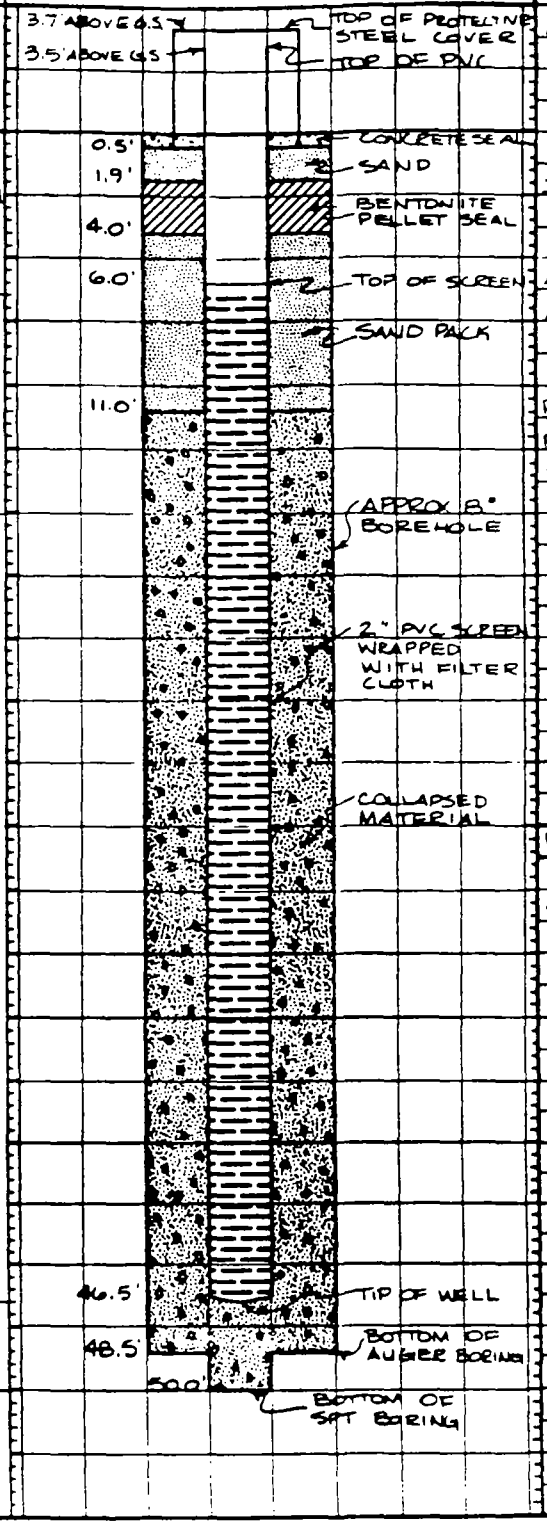
JOB NO 553-3079 PROJECT SCDHEC/BLUFF RD/CC WELL NO D-12 SHEET 1 OF 1
GA INSP WBL/EWS DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV 135.9 WATER DEPTH 6.55
WEATHER RAINING DRILLING COMPANY TRI-STATE COLLAR ELEV 139.37 DATE/TIME 9/14/95 @ 1400
TEMP 70°F DRILL RIG CME 55 DRILLER DJ/RJ STARTED 4:00 PM/8/25/95 COMPLETED 11:00 AM/8/28/95
TIME / DATE TIME / DATE

MATERIALS INVENTORY

WELL CASING	2 in dia 9.5 ft	WELL SCREEN	2 in. dia 40 ft	BENTONITE SEAL	2.1 FEET
CASING TYPE	SCH 40 PVC	SCREEN TYPE	SLOTTED PVC	INSTALLATION METHOD	HAND POURED
JOINT TYPE	FLUSH THREAD TRI-LOC	SLOT SIZE	.010 INCH	FILTER PACK QTY	7.0 FEET
GROUT QUANTITY	—	CENTRALIZERS	—	FILTER PACK TYPE	CHEROKEE FAIRSAND
GROUT TYPE	—	DRILLING MUD TYPE	—	INSTALLATION METHOD	HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
135.9	GROUND SURFACE
0.0	STIFF, LIGHT BROWN AND WHITE CLAY TRACE FINE SAND (CL)
129.4	
6.5	LOOSE, TAN FINE SAND SOME SILT (SM)
120.9	
15.0	COMPACT, TAN FINE TO COARSE SAND, TRACE SILT (SP)
89.4	
46.5	STIFF, DARK GRAY CLAY (CH)
85.9	
50.0	BOTTOM OF HOLE AT 50.0 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED 40.0' SCREEN
9.5' CASING
0.5' WELL POINT
AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 11.0'.

PLACED SAND PACK TO 4.0'
PLACED BENTONITE SEAL TO 1.9'
PLACED SAND TO 0.5'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

9/5/95 - SURGED THE WELL SCREEN THROUGHOUT, HAND PUMPED 30 GALLONS. SURGED BOTTOM 20 FEET, PUMPED 20 GALLONS, SURGED BOTTOM 20 FEET, PUMPED 20 GALLONS. SURGED TOP 20 FEET, PUMPED 20 GALLONS. SURGED TOP 20 FEET, PUMPED 20 GALLONS.

3 10 00212

Golder Associates

MONITORING WELL INSTALLATION LOG

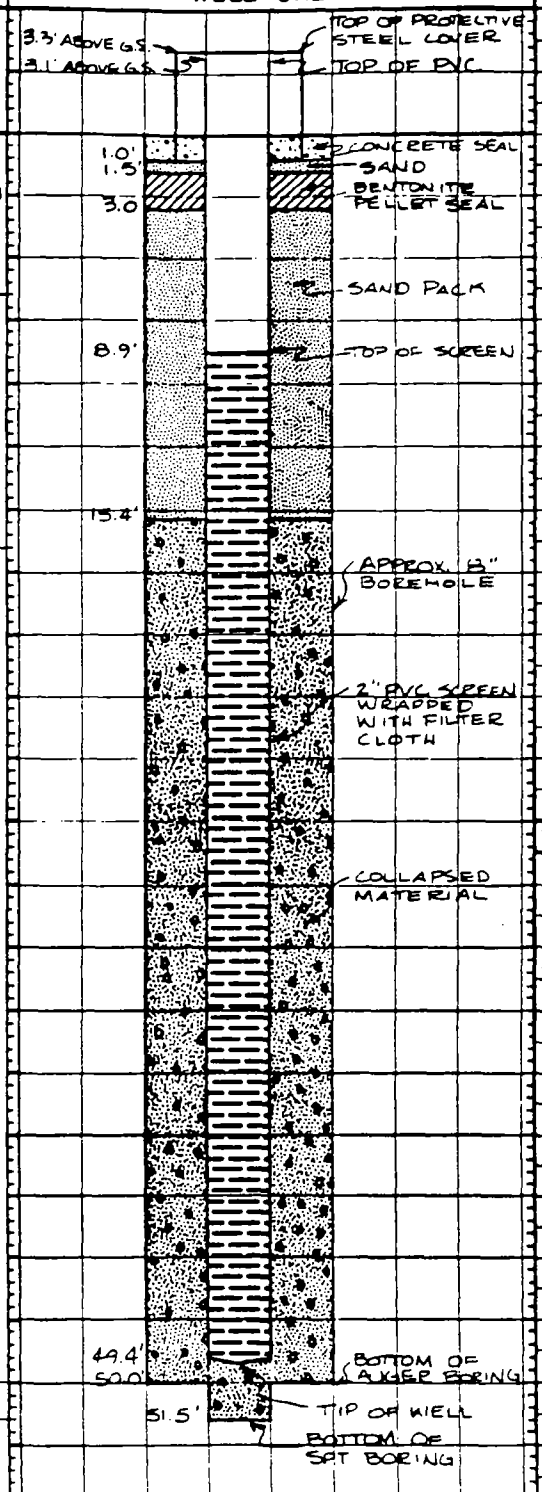
JOB NO 6533019 PROJECT SCDHEC/BLUFF RD/S.C. WELL NO P-13 SHEET 1 OF 1
GA INSP WBL/EWS DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV 139.6 WATER DEPTH 11.05
WEATHER CLEAR DRILLING COMPANY TRI-STATE COLLAR ELEV 142.69 DATE/TIME 8/27/85 10:00 AM
TEMP 70° F DRILL RIG CME 55 DRILLER DJ/RJ STARTED 8:30AM/8/27/85 COMPLETED 5:00PM/8/28/85
TIME / DATE TIME / DATE

MATERIALS INVENTORY

WELL CASING	2 in. dia. 12.0 l.f.	WELL SCREEN	2 in. dia. 40 l.f.	BENTONITE SEAL	1.5 FEET
CASING TYPE	SCH 40 PVC	SCREEN TYPE	SLOTTED PVC	INSTALLATION METHOD	HAND POURED
JOINT TYPE	FLUSH THREAD TRI-LOK	SLOT SIZE	.010 INCH	FILTER PACK QTY	12.4 FEET
GROUT QUANTITY	—	CENTRALIZERS	—	FILTER PACK TYPE	CHEROKEE FA 13 SAND
GROUT TYPE	—	DRILLING MUD TYPE	—	INSTALLATION METHOD	HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
139.6	GROUND SURFACE
0.0	STIFF, LIGHT BROWN AND WHITE CLAY TRACE FINE SAND (CL)
133.1	
6.5	LOOSE, TAN FINE SAND, SOME SILT (SM)
123.1	
16.5	COMPACT, TAN FINE TO COARSE SAND TRACE SILT, TRACE FINE GRAVEL (SP)
89.6	
50.0	STIFF, DARK GRAY TO BLACK CLAY (CH)
BB 1	
51.5	BOTTOM OF HOLE AT 51.5 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED 40.0' SCREEN
12.0' CASING
0.5' WELL POINT
AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 15.4'

PLACED SAND PACK TO 3.0
PLACED BENTONITE SEAL TO 1.5'
PLACED SAND TO 1.0'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

9/5/85- SURGED WELL SCREEN THROUGHOUT.
PUMPED 30 GALLONS.
SURGED BOTTOM 20 FEET
PUMPED 20 GALLONS.
SURGED TOP 20 FEET.
PUMPED 30 GALLONS.

3 10 00213

MONITORING WELL INSTALLATION LOG

JOB NO 8533079 PROJECT SCDHEC / BLUFF RD / SC — WELL NO P-14 — SHEET 1 OF 1
GA INSP WPL/FWS — DRILLING METHOD HOLLOW STEM AUGER — GROUND ELEV 138.7 — WATER DEPTH 10.7
WEATHER CLEAR — DRILLING COMPANY TRI-STATE — COLLAR ELEV 141.67 — DATE/TIME 8/27/85 5:25pm
TEMP 90° F — DRILL RIG CME 55 — DRILLER DJ/RJ — STARTED 4:35pm/8/27/85 (TIME / DATE) — COMPLETED 5:30pm/8/27/85 (TIME / DATE)

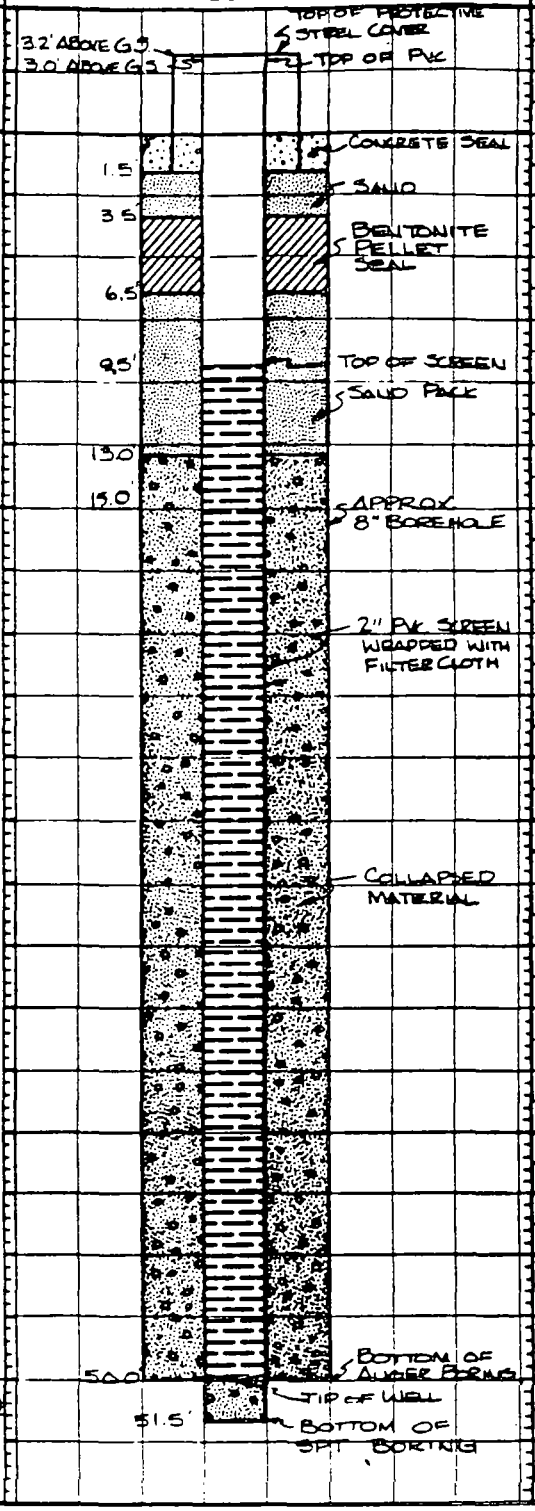
3 10 00214

MATERIALS INVENTORY

WELL CASING 2 in. dia. 12.5 l.f.	WELL SCREEN 2 in. dia. 40 l.f.	BENTONITE SEAL 3 FEET
CASING TYPE SCH 40 PVC	SCREEN TYPE SLOTTED PVC	INSTALLATION METHOD HAND POURED
JOINT TYPE FLUSH THREAD TRI-LOK	SLOT SIZE .010 INCH	FILTER PACK QTY 6.5 FEET
GROUT QUANTITY —	CENTRALIZERS —	FILTER PACK TYPE CHEROKEE FAIR SAND
GROUT TYPE —	DRILLING MUD TYPE —	INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
138.7	GROUND SURFACE
0.0	STIFF, LIGHT BROWN AND WHITE CLAY TRACE FINE SAND (CL)
128.7	
10.0	LOOSE, TAN, FINE SAND SOME SILT (SM)
123.7	
15.0	COMPACT, LIGHT BROWN, FINE TO COARSE SAND TRACE SILT, TRACE FINE GRAVEL (SP)
88.7	
50.0	STIFF, GRAY CLAY (CH)
87.2	
51.5	BOTTOM OF HOLE AT 51.5 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 40.0' SCREEN
12.5' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 13.0'

PLACED SAND PACK TO 6.5'
PLACED BENTONITE SEAL TO 3.5'
PLACED SAND TO 1.5'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE

WELL DEVELOPMENT NOTES

9/5/85: SURGED WELL SCREEN THROUGHOUT. PUMPED 30 GALLONS. SURGED BOTTOM 20 FEET. PUMPED 20 GALLONS. SURGED TOP 20 FEET. PUMPED 30 GALLONS.

MONITORING WELL INSTALLATION LOG

JOB NO 953-3079 PROJECT SCDHEC/BLUFF RD/S.C. WELL NO P-15 SHEET 1 OF 1
GA INSP. WBL DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV 137.6 WATER DEPTH 8.7'
WEATHER CLEAR DRILLING COMPANY TRI-STATE COLLAR ELEV 140.53 DATE/TIME 9/4/85 11:00
TEMP. 85°F DRILL RIG CME 55 DRILLER DT/RJ STARTED 9:30 AM / 9/4/85 (TIME / DATE) COMPLETED 11:00 / 9/4/85 (TIME / DATE)

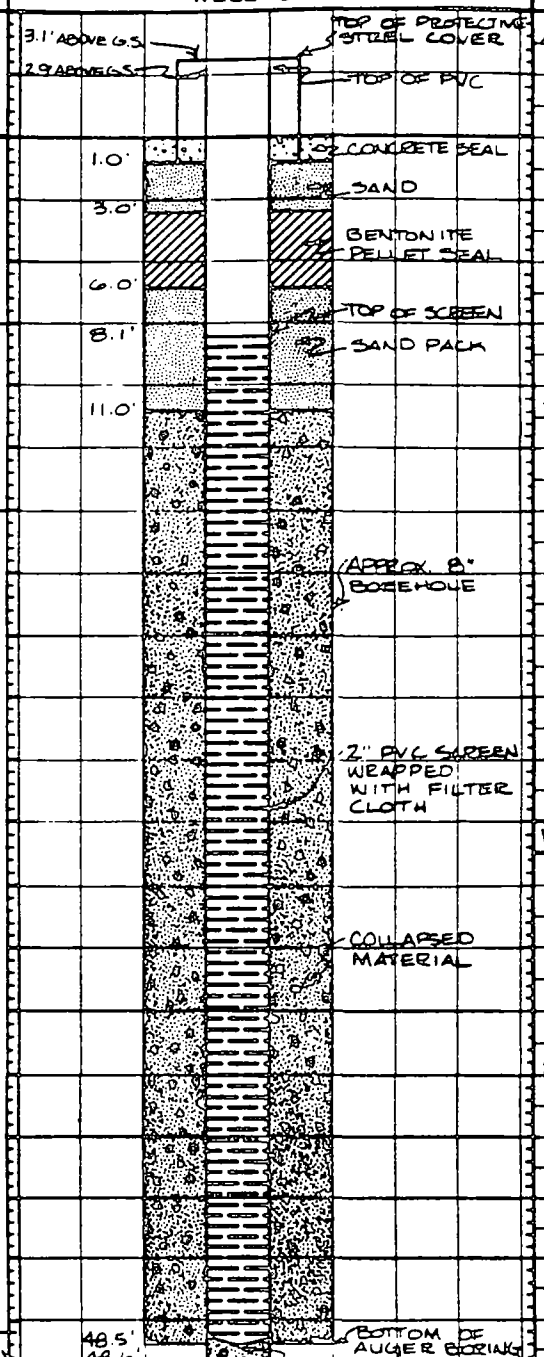
3 10 00215

MATERIALS INVENTORY

WELL CASING	2 in. dia. 11 ft.	WELL SCREEN	2 in. dia. 40 ft.	BENTONITE SEAL	3.0 FEET
CASING TYPE	SCH 40 PVC	SCREEN TYPE	SLOTTED PVC	INSTALLATION METHOD	HAND POURED
JOINT TYPE	FLUSH THREAD TRI-LOC	SLOT SIZE	.010 INCH	FILTER PACK QTY	5.0 FEET
GROUT QUANTITY	—	CENTRALIZERS	—	FILTER PACK TYPE	CHEROKEE FA13 SAND
GROUT TYPE	—	DRILLING MUD TYPE	—	INSTALLATION METHOD	HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.6	GROUND SURFACE
0.0	LIGHT BROWN CLAY, TRACE FINE SAND (CL)
130.1	
7.5	TAN FINE SAND SOME SILT
122.6	
15.0	COMPACT, TAN FINE TO MEDIUM SAND, TRACE SILT (SP)
89.6	
48.0	STIFF, GRAY CLAY (CH)
87.9	
49.7	BOTTOM OF HOLE AT 49.7 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 40.0' SCREEN
11.0' CASING
0.5' WELL POINT
AFTER PULLING THE AUGERS THE HOLE COLLAPSED TO 11.0'

PLACED SAND PACK TO 6.0'
PLACED BENTONTONITE SEAL TO 3.0'
PLACED SAND TO 1.0'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

9/5/85 - SURGED WELL SCREEN THROUGHOUT.
PUMPED 30 GALLONS.
SURGED BOTTOM 20 FEET.
PUMPED 20 GALLONS.
SURGED TOP 20 FEET.
PUMPED 30 GALLONS.

MONITORING WELL INSTALLATION LOG

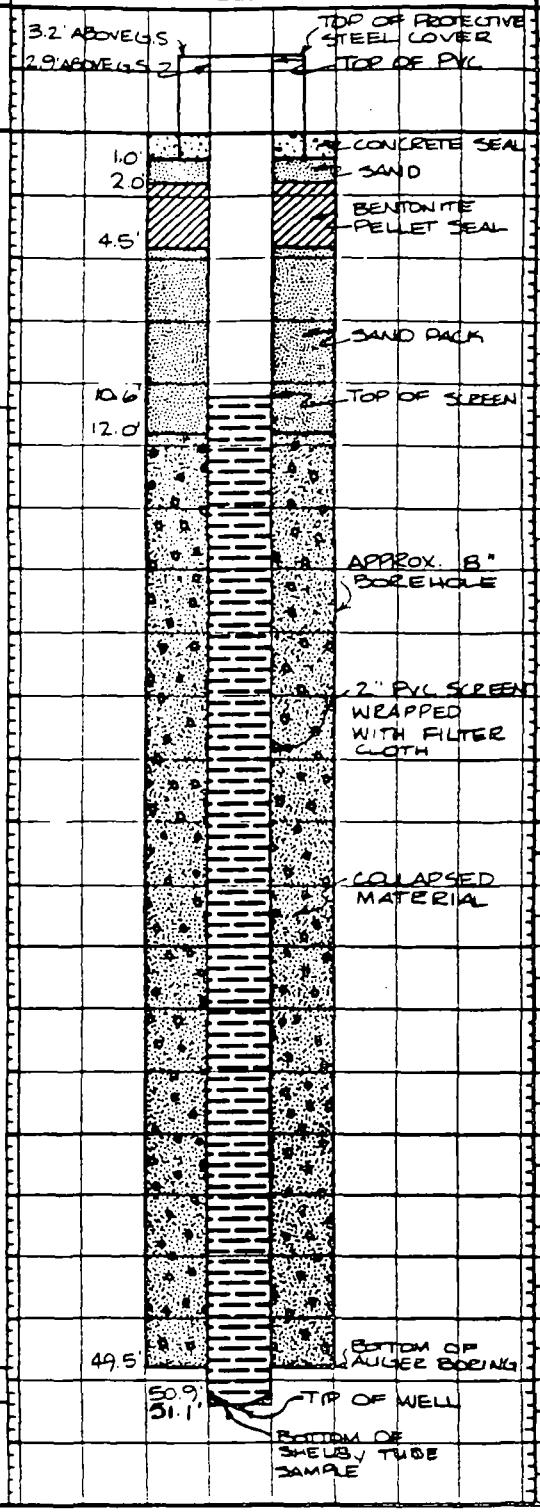
JOB NO 853-3009 PROJECT SCDHEC/BLUFF RD/SC WELL NO P-16 SHEET 1 OF 1
GA INSP. WBL DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV. 138.5 WATER DEPTH 10.3
WEATHER CLEAR DRILLING COMPANY TRI-STATE COLLAR ELEV 141.38 DATE/TIME 9/6/85 @ 11
TEMP 90° F DRILL RIG CME 55 DRILLER DJ/RJ STARTED 4:30 PM/9/4/85 COMPLETED 5:15 PM/9/5/85
TIME / DATE TIME / DATE

MATERIALS INVENTORY

WELL CASING 2 in. dia. 13.5 Lf	WELL SCREEN 2 in. dia. 40 Lf	BENTONITE SEAL 2.5 FEET
CASING TYPE SCH 40 PVC	SCREEN TYPE SLOTTED PVC	INSTALLATION METHOD HAND DROPPED
JOINT TYPE FLUSH THREAD TRI-LOC	SLOT SIZE .010 INCH	FILTER PACK QTY 7.5 FEET
GROUT QUANTITY —	CENTRALIZERS —	FILTER PACK TYPE CHEROKEE FLINT SAND
GROUT TYPE —	DRILLING MUD TYPE —	INSTALLATION METHOD HAND DROPPED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
138.5	GROUND SURFACE
0.0	FIRM, LIGHT BROWN AND WHITE CLAYEY SILT, LITTLE FINE SAND (ML)
127.5	
11.0	COMPACT, TAN FINE TO MEDIUM SAND LITTLE TO TRACE SILT (SP-SM) TO (SP)
89.0	
+9.5	STIFF, DARK GRAY CLAY (CH)
87.6	
50.9	BOTTOM OF HOLE AT 50.9 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE

INSTALLED 40' SCREEN
13.5' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 12.0'

PLACED SAND PACK TO 4.5'
PLACED BENTONITE SEAL TO 2.0'
PLACED SAND TO 1.0'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL

NOTE:
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

9/5/85 - SURGED WELL SCREEN THROUGHOUT.
PUMPED 30 GALLONS.
SURGED BOTTOM 20 FEET.
PUMPED 20 GALLONS.
SURGED TOP 20 FEET.
PUMPED 30 GALLONS.

3 10 00216

MONITORING WELL INSTALLATION LOG

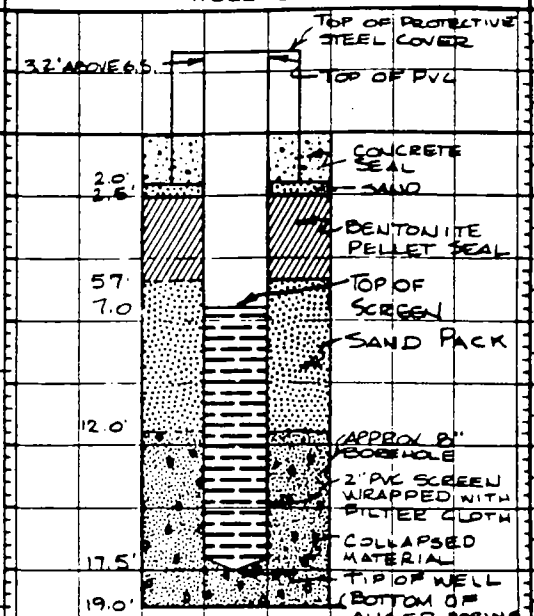
JOB NO 853-3079	PROJECT SCDHEC/BLUFF RD/SC	WELL NO P-17	SHEET 1 OF 1
GA INSP AES	DRILLING METHOD HOLLOW STEM AUGER	GROUND ELEV 134.2	WATER DEPTH 6.57'
WEATHER FAIR	DRILLING COMPANY TRI-STATE	COLLAR ELEV 137.59	DATE/TIME 11-14-85/2:00
TEMP 70's	DRILL RIG CME 55	DRILLER D. JONES	STARTED 9:45 / 11-13-85 (TIME / DATE)	COMPLETED 10:45 / 11-13-85 (TIME / DATE)

MATERIALS INVENTORY

WELL CASING 2" in. dia. 10.2 l.f.	WELL SCREEN 2" in. dia. 10 l.f.	BENTONITE SEAL 20# 1/2" PELLETS
CASING TYPE SCH 40 PVC	SCREEN TYPE MILLED SLOT PVC	INSTALLATION METHOD HAND POURED
JOINT TYPE FLUSH THREADED	SLOT SIZE 0.020"	FILTER PACK QTY 280#
GROUT QUANTITY –	CENTRALIZERS –	FILTER PACK TYPE CHEROKEE FA 13 SAND
GROUT TYPE –	DRILLING MUD TYPE –	INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
134.2	GROUND SURFACE
0.0	COMPACT FINE SAND AND SILTY CLAY (SC)
124.7	
9.5'	LOOSE GREY SLIGHTLY MICACEOUS FINE TO MEDIUM SAND TRACE SILT. (SP)
115.2	
19.0'	BOTTOM OF HOLE AT 19.0'

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 10.0' SCREEN
10.2' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 12.0'
PLACED SAND PACK TO 7.0'
PLACED BENTONITE SEAL TO 2.5'
PLACED SAND TO 2.0'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL

NOTES: FILTER FABRIC PULLED OFF AT SCREEN DURING INSTALLATION. ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

11/16/85 SURGED WELL SCREEN THROUGHOUT, PUMPED 30 GAL.

3 10 00217

MONITORING WELL INSTALLATION LOG

JOB NO B53-3079 PROJECT SCDHEC/BLUFF RD/S.C. WELL NO P-18 SHEET 1 OF 1
GA INSP AES DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV 139.7 WATER DEPTH 13.50
WEATHER CLOUDY DRILLING COMPANY TRI-STATE COLLAR ELEV 141.98 DATE/TIME 11-13-85/12.00
TEMP 70°F DRILL RIG CME 55 DRILLER D.JONES STARTED 8:00 / 11-13-85 COMPLETED 12.00 / 11-13-85
TIME / DATE TIME / DATE

MATERIALS INVENTORY

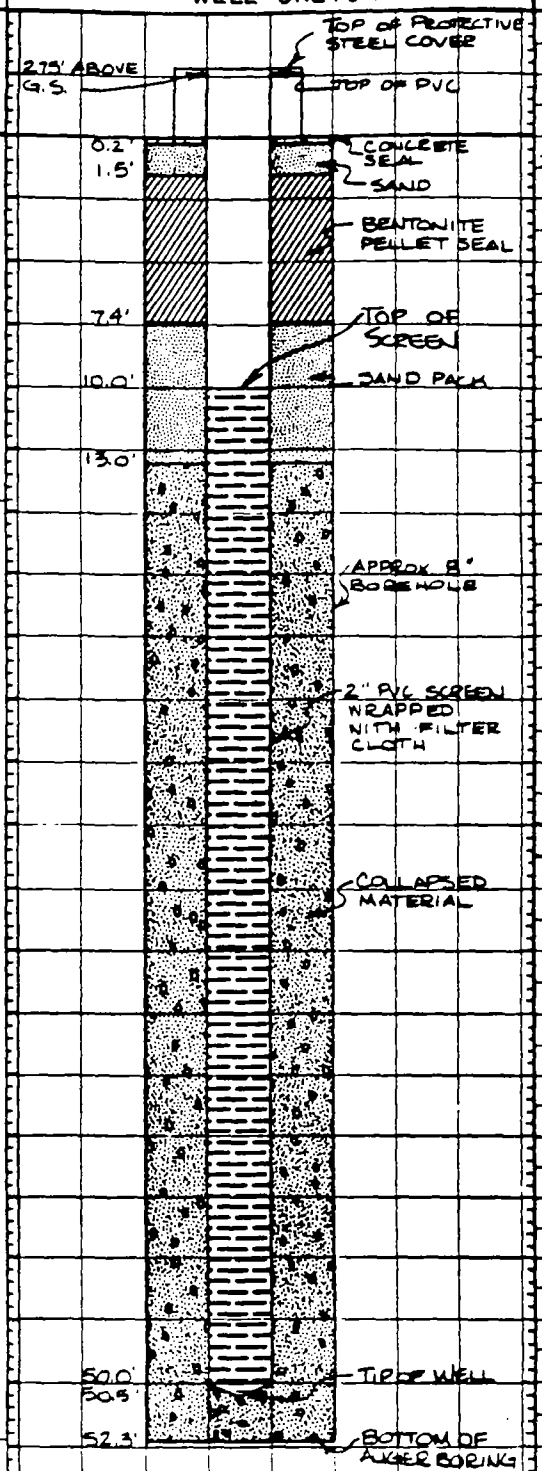
WELL CASING 2" in. dia. 12.75 LF
CASING TYPE SCH 40 PVC
JOINT TYPE FLUSH THREADED
GROUT QUANTITY —
GROUT TYPE —

WELL SCREEN 2" in. dia. 40 LF
SCREEN TYPE MILLED SLOT PVC
SLOT SIZE 0.020"
CENTRALIZERS —
DRILLING MUD TYPE —

BENTONITE SEAL 50 # 1/2" PELLETS
INSTALLATION METHOD HAND POURED
FILTER PACK QTY 350 #
FILTER PACK TYPE CHEROKEE FA13 SAND
INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
139.2	GROUND SURFACE
0.0	COMPACT GREY TO RED-BROWN FINE SAND, SOME SILTY CLAY (SC)
124.7	
14.5	LOOSE GREY FINE TO COURSE SAND, TRACE TO LITTLE SILT, TRACE TO LITTLE FINE GRAVEL (SP)
86.9	
52.3	BOTTOM OF HOLE AT 52.3 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 40.0' SCREEN
12.75' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 13.0'

PLACED SAND PACK TO 7.4'
PLACED BENTONITE PELLET SEAL TO 1.5'
PLACED SAND TO 0.2'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE: ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

11/14/85 - SURGED WELL SCREEN THROUGHOUT, PUMPED 30 GAL. SURGED UPPER 20 FEET, PUMPED 30 GAL.

MONITORING WELL INSTALLATION LOG

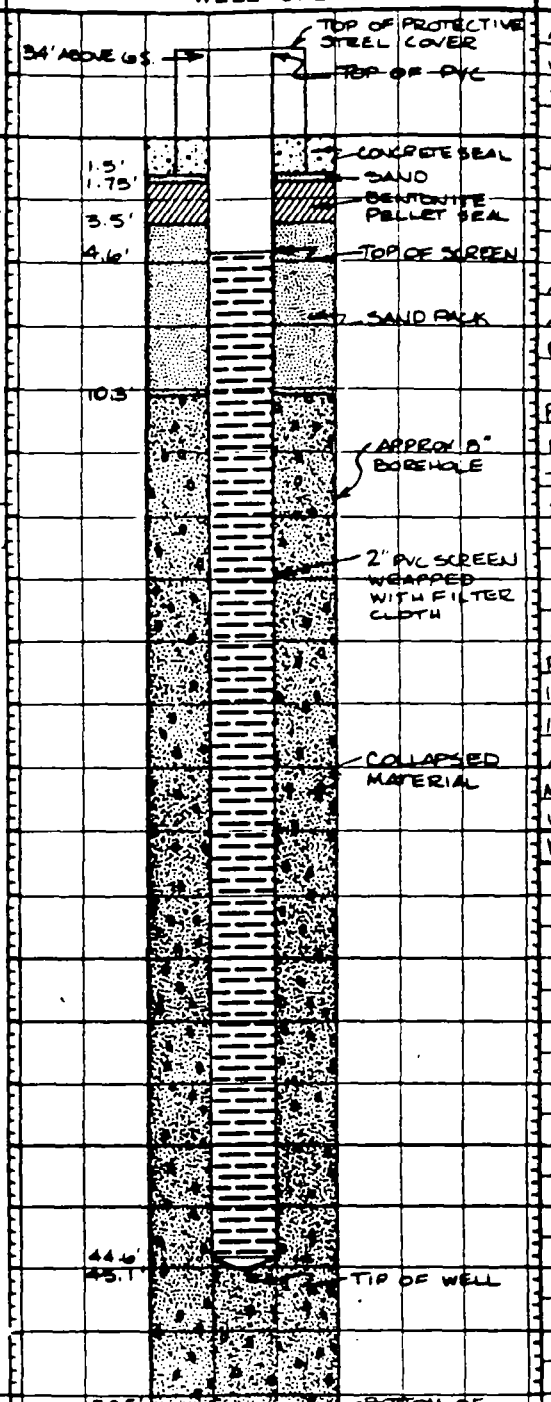
JOB NO 853-3079 PROJECT SCDHEC/BLUFF RD/SC WELL NO P-19 SHEET 1 OF 1
GA INSP AES DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV 137.6 WATER DEPTH 11.84
WEATHER CLOUDY DRILLING COMPANY TRI-STATE COLLAR ELEV 140.95 DATE/TIME 11/17/85 3:00
TEMP 60's DRILL RIG CME 55 DRILLER P JONES STARTED 9:00 TIME / 11/16/85 DATE COMPLETED 3:00 TIME / 11/17/85 DATE

MATERIALS INVENTORY

WELL CASING	2" in. dia 8.0 l.f	WELL SCREEN	2" in. dia 40 l.f	BENTONITE SEAL	25 # 1/2" PELLETS
CASING TYPE	SCH 40 PVC	SCREEN TYPE	MILLED SLOT PVC	INSTALLATION METHOD	HAND POURED
JOINT TYPE	FLUSH THREADED	SLOT SIZE	0.020"	FILTER PACK QTY	335 #
GROUT QUANTITY	–	CENTRALIZERS	–	FILTER PACK TYPE	CHEROKEE FA 13 SAND
GROUT TYPE	–	DRILLING MUD TYPE	–	INSTALLATION METHOD	HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.6	GROUND SURFACE
0.0	COMPACT YELLOW BROWN FINE SAND, AND SILTY CLAY, WITH PACKETS OF GREY FINE SAND, TRACE SILT (SC)
123.1	
14.5	LOOSE LIGHT GREY FINE TO COARSE SAND, TRACE TO LITTLE CLAYEY SILT (SP)
87.6	
50.0' 50.5 87.1	STIFF VERY DARK GRAY SILTY CLAY (CH)
	BOTTOM OF HOLE AT 50.5 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED 40.0' SCREEN
8.0' CASING
0.5' WELLPOINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 10.3'.

PLACED SAND PACK TO 3.5'
PLACED BENTONITE SEAL TO 1.75'
PLACED SAND TO 1.5'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTES: FILTER FABRIC PULLED OFF OF UPPER 10' OF SCREEN DURING INSTALLATION.
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

WELL NOT DEVELOPED

3 10 00219

MONITORING WELL INSTALLATION LOG

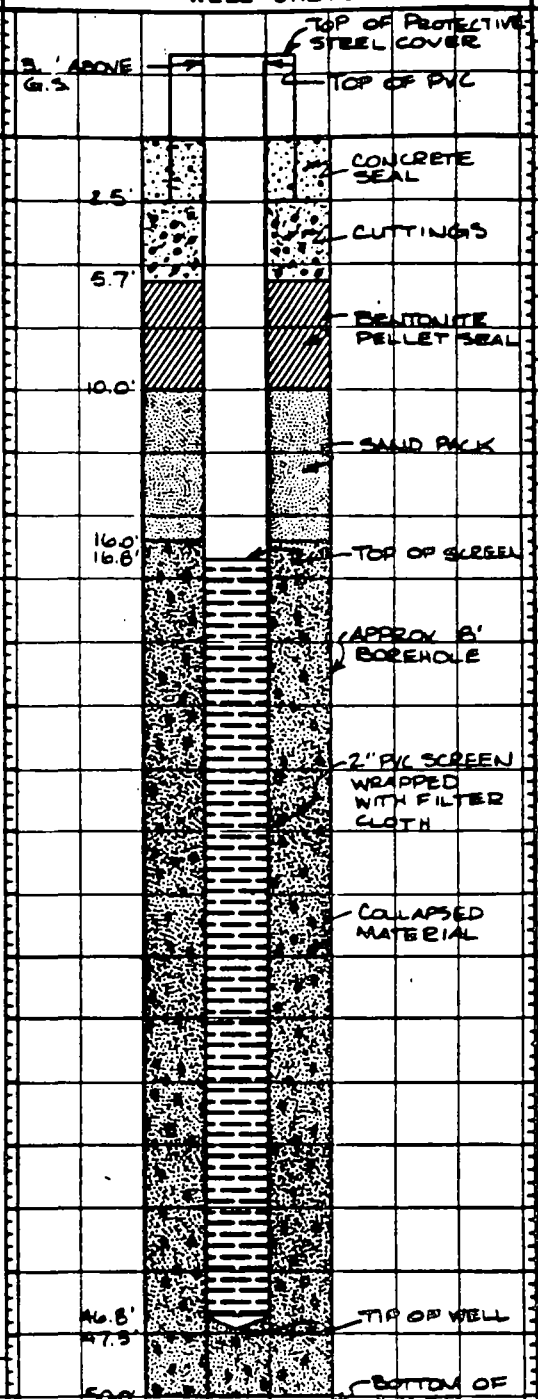
JOB NO. 893 3079	PROJECT SCDHEC/BLUFF RD/S.C		WELL NO P-20	SHEET 1 OF 1	
QA INSP. AES	DRILLING METHOD HOLLOW STEM AUGER		GROUND ELEV 137.0	WATER DEPTH 11.80	
WEATHER RAIN/	DRILLING COMPANY TRI-STATE		COLLAR ELEV 139.95	DATE/TIME 11-21-95/12:10	
TEMP. 70's	DRILL RIG CME 55	DRILLER D.JONES	STARTED 10:10 / 11-21-95 (TIME / DATE)	COMPLETED 12:10/11-21-95 (TIME / DATE)	

MATERIALS INVENTORY

WELL CASING 2" in. dia. 20.0 l.f.	WELL SCREEN 2" in. dia. 30 l.f.	BENTONITE SEAL 50 # 1/2" PELLETS
CASING TYPE SCH 40 PVC	SCREEN TYPE MILLED SLOT PVC	INSTALLATION METHOD HAND POURED
JOINT TYPE FLUSH THREADED	SLOT SIZE 0.020"	FILTER PACK QTY 350 #
GROUT QUANTITY –	CENTRALIZERS –	FILTER PACK TYPE CHEROKEE GA 15 SAND
GROUT TYPE –	DRILLING MUD TYPE –	INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.0	GROUND SURFACE
0.0	STIFF LIGHT GREY TO RED-BROWN SILTY CLAY, AND FINE TO COARSE SAND (CL)
119.5	
117.5	LOOSE LIGHT GRET FINE TO COARSE SAND TRACE TO LITTLE FINE TO MEDIUM GRAVEL TRACE TO LITTLE SILT (SP)
89.2	
87.8	FIRM MEDIUM GREY CLAYEY SILT WITH FINE SAND. (ML)
87.0	
50.0	BOTTOM OF HOLE AT 50.0 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 30.0' SCREEN
20.0' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 16.0'

PLACED SAND PACK TO 10.0'
PLACED BENTONITE SEAL TO 5.7'
PLACED CUTTINGS TO 2.5'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.
NOTES: SCREEN NOT WRAPPED WITH FILTER FABRIC.
ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

WELL NOT DEVELOPED

3 10 00220

MONITORING WELL INSTALLATION LOG

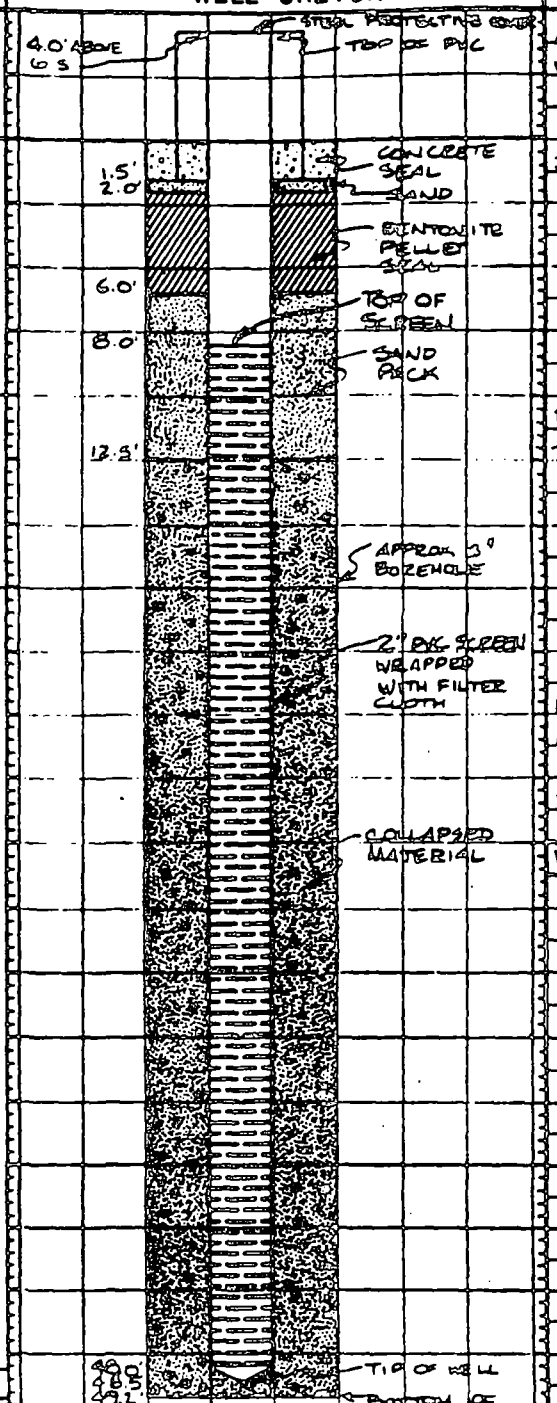
JOB NO. 852 3079	PROJECT SCDHEC/BLUFF RD/SC	WELL NO P-21	SHEET 1 OF 1		
GA DISP. GES	DRILLING METHOD HOLLOW STEM AUGER	GROUND ELEV 137.7	WATER DEPTH 12.53		
WEATHER FAIR	DRILLING COMPANY TRI-STATE	COLLAR ELEV 141.67	DATE/TIME 3:30 12-4-85		
TEMP 40's	DRILL RIG CME 55	DRILLER RICK	STARTED 1:45 / 12-4-85 (TIME / DATE)	COMPLETED 3:30 / 12-4-85 (TIME / DATE)	

MATERIALS INVENTORY

WELL CASING 2"	D. dia. 12 ft	WELL SCREEN 2"	D. dia. 40 ft	BENTONITE SEAL 25 ea 1/4" PELLETS	
CASING TYPE SCH 40 PVC		SCREEN TYPE MILLED SLOT PVC		INSTALLATION METHOD HAND POURED	
JOINT TYPE FLUSH THREADED TEFLON WRAPPED		SLOT SIZE 0.010"		FILTER PACK QTY 350#	
GROUT QUANTITY —		CENTRALIZERS —		FILTER PACK TYPE CHEROKEE FM 13 SAND	
GROUT TYPE —		DRILLING MUD TYPE —		INSTALLATION METHOD HAND POURED	

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.7	GROUND SURFACE
0.0	STIFF MOTTLED ORANGE BROWN AND BLACK SILTY CLAY SOME FINE SAND (CL)
127.7	
10.0	COMPACT ORANGE BROWN MICACEOUS FINE SAND, SOME TO LITTLE CLAYEY SILT (SM)
120.2	
17.5	COMPACT TO LOOSE FINE TO COARSE SAND, TRACE SILT (SP)
89.5	
48.2	VERY STIFF MEDIUM GRAY SILTY CLAY SOME FINE SAND (CL)
88.5	
49.2	BOTTOM OF HOLE AT 49.2 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 40.0' SCREEN
12.0' CASING
0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 12.5'

PLACED SAND PACK TO 6.0'
PLACED BENTONITE SEAL TO 2.0'
PLACED SAND TO 1.5'
SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.

NOTE: ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

WELL NOT DEVELOPED

3 10 00221

MONITORING WELL INSTALLATION LOG

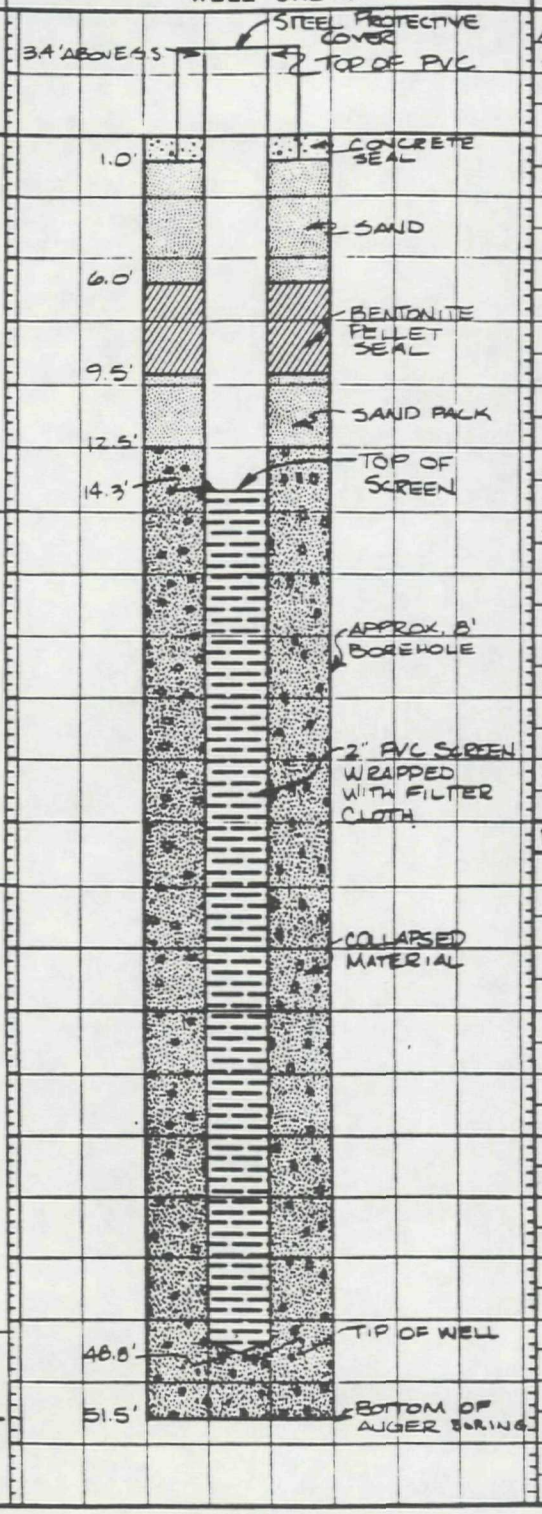
JOB NO 853 3079	PROJECT SCDHEC/BLUFF RD/S.C		WELL NO P-22	SHEET 1 OF 1	
GA INSP AES	DRILLING METHOD HOLLOW STEM AUGER		GROUND ELEV 137.8	WATER DEPTH 12 e.4	
WEATHER CLOUDY	DRILLING COMPANY TRI-STATE		COLLAR ELEV 141.15	DATE/TIME 11-19-85 / 10 40	
TEMP 70's	DRILL RIG CME 55	DRILLER D. JONES	STARTED 9:30 TIME / 11-19-85 DATE	COMPLETED 11 30 / 11-19-85 TIME / DATE	

MATERIALS INVENTORY

WELL CASING 2" in. dia. 17.7 l.f.	WELL SCREEN 2" in. dia. 35 l.f.	BENTONITE SEAL 50 # 1/2" PELLETS
CASING TYPE SCH 40 PVC	SCREEN TYPE MILLED SLOT PVC	INSTALLATION METHOD HAND POURED
JOINT TYPE FLUSH THREADED	SLOT SIZE 0.020"/0.010"	FILTER PACK QTY 200 #
GROUT QUANTITY –	CENTRALIZERS –	FILTER PACK TYPE CHEROKEE FA 13 SAND
GROUT TYPE –	DRILLING MUD TYPE –	INSTALLATION METHOD HAND POURED

ELEV/DEPTH	SOIL/ROCK DESCRIPTION
137.8	GROUND SURFACE
0.0	DENSE TO LOOSE TAN FINE SAND AND CLAYEY SILT (SC)
122.8	
15.0'	COMPACT TO LOOSE LIGHT GREY FINE TO COARSE SAND, SOME CLAYEY SILT (SM)
107.8	
30.0	COMPACT TO LOOSE, LIGHT GRAY FINE TO COARSE SAND, LITTLE CLAYEY SILT. (SP-SM)
89.8	
48.0'	BLACK MINGO CLAY (CH)
86.3	
51.5'	BOTTOM OF HOLE AT 51.5 FT.

WELL SKETCH



INSTALLATION NOTES

ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.

INSTALLED: 35.0' SCREEN (0.010" SLOT SCREEN 14.3'-19.3' 0.020" SLOT SCREEN 19.3'-49.3')

10.0' CASING

0.5' WELL POINT

AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 12.5'. PLACED SAND PACK TO 9.5' PLACED BENTONITE SEAL TO 6.0' PLACED SAND TO 1.0' SET PROTECTIVE STEEL COVER IN CONCRETE SEAL. NOTES: SCREEN NOT FILTER FABRIC WRAPPED. ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE.

WELL DEVELOPMENT NOTES

WELL NOT DEVELOPED

3 10 00222

MONITORING WELL INSTALLATION LOG

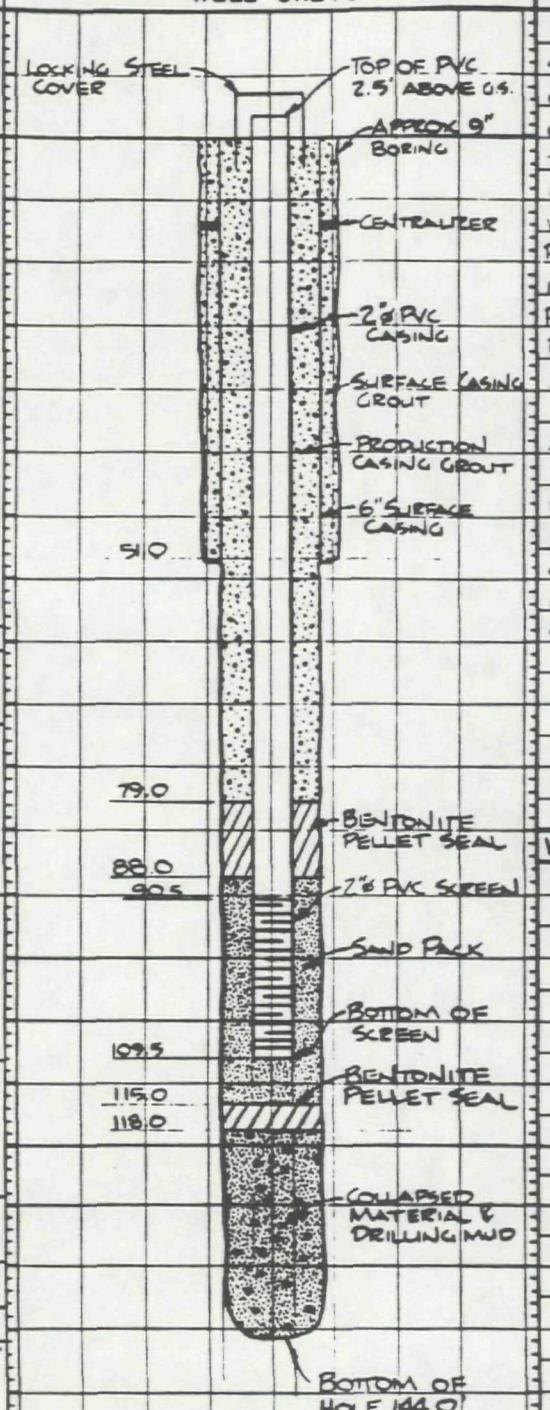
JOB NO 853-3079	PROJECT SCDHEC / BLUFF ROAD / SC		WELL NO PW1	SHEET 1 OF 1	
GA INSP AES	DRILLING METHOD MUD ROTARY		GROUND ELEV 136.9	WATER DEPTH –	
WEATHER CLDY	DRILLING COMPANY GEO CONSTRUCTION TESTING		COLLAR ELEV 139.4	DATE/TIME –	
TEMP 60's	DRILL RIG CME 55	DRILLER D. JONES	STARTED 3:00 TIME / 2/21/85 DATE	COMPLETED 10:00 TIME / 2/22/85 DATE	

MATERIALS INVENTORY

WELL CASING 2" in. dia. 93 lf	WELL SCREEN 2" in. dia. 20 lf	BENTONITE SEAL 100#
CASING TYPE 2" PVC	SCREEN TYPE PVC	INSTALLATION METHOD POURED
JOINT TYPE FLUSH THREADED	SLOT SIZE 0.020"	FILTER PACK QTY 350#
GROUT QUANTITY 11 SACKS	CENTRALIZERS STEEL SPRING	FILTER PACK TYPE QUIKRETE ALL PURPOSE SAND
GROUT TYPE 7.5 GAL. H_2O · 1 SACK CEMENT : 2 QUICK GEL	DRILLING MUD TYPE 50# QUICK GEL: ~ 200 GAL H_2O	INSTALLATION METHOD POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
136.9	GROUND SURFACE
0.0	REFER TO BORING BP-2 FOR STRATIGRAPHY FROM 0 TO 49 FT.
78.9	BEGIN SAMPLING AT 58'
58.0	GRAY, SILTY CLAY, SOME FINE TO COARSE SAND (CH)
75.9 61.0	
67.9	TAN FINE SAND, SOME SILT (SM)
70.0	THINLY BEDDED FINE TO MEDIUM SAND, SOME SILTY CLAY. (SM)
90.0	THINLY BEDDED, FINE TO MEDIUM SAND, SOME SILTY CLAY. (SM)
26.9	
110.0	VERY STIFF LIGHT GRAY AND TAN SILTY CLAY, TRACE FINE SAND (CL)
10.4	
126.5	MOTTLED WHITE, PINK AND LAVENDER, FINE TO MEDIUM SAND, SOME SILT. (SM)
2.4	
134.5	BROWN FINE TO MEDIUM SAND, TRACE SILT (SP)
-3.1	
140.0	HARD WHITE SLTY CLAY, LITTLE FINE SAND (CL)
-7.1	
144.0	BOTTOM OF HOLE 144.0'

WELL SKETCH



INSTALLATION NOTES

DRILLED 9" HOLE TO 51', SET AND GROUTED SURFACE CASING USING 4 SACKS OF CEMENT. DRILLED 5" HOLE TO 144' DEPTH. HOLE COLLAPSED TO 118 FT BEFORE WELL COULD BE INSTALLED. PLACED 25 LBS BENTONITE IN LOWER SEAL. INSTALLED PVC SCREEN AND CASING. PLACED SAND PACK. JETTED WELL FOR APPROX 1 HOUR TO REMOVE FINES AND DRILLING MUD. PLACED UPPER BENTONITE PELLET SEAL. GROUTED AROUND 2" CASING TO SURFACE USING 7 SACKS OF CEMENT. INSTALLED STEEL WELL COVER.

WELL DEVELOPMENT NOTES

USED JET PUMP TO PUMP 25 gpm FOR 2 HRS.

3 10 00223

MONITORING WELL INSTALLATION LOG

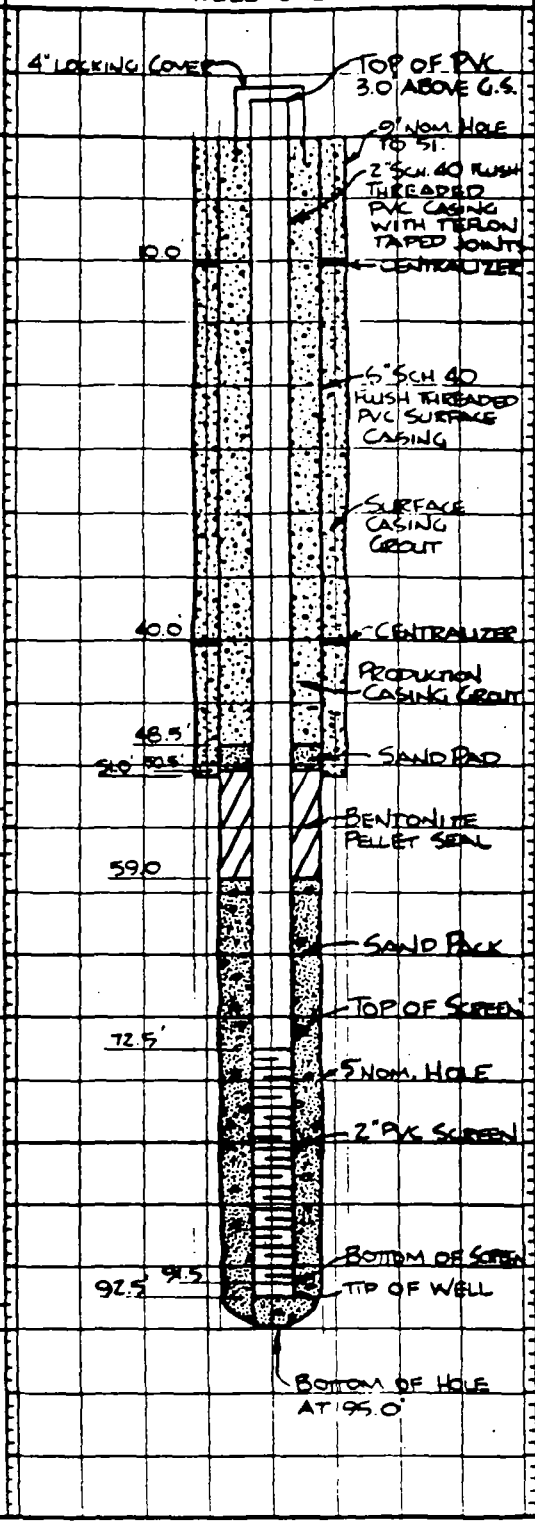
JOB NO 05-3-3079	PROJECT SCHEK / BLUFF ROAD / SK	WELL NO DW 2	SHEET 1 OF 1
GA INSP AES	DRILLING METHOD MUD ROTARY	GROUND ELEV 137.3	WATER DEPTH –
WEATHER –	DRILLING COMPANY GEO CONSTRUCTION TESTING	COLLAR ELEV 140.3	DATE/TIME –
TEMP –	DRILL RIG CME 55	DRILLER D JONES	STARTED 12:30 (TIME) 2/23/05 (DATE) COMPLETED 12:00 (TIME) 2/24/05 (DATE)

MATERIALS INVENTORY

WELL CASING 2" in. dia. 75 l.f.	WELL SCREEN 2" in. dia. 20 l.f.	BENTONITE SEAL 50 lbs
CASING TYPE PVC	SCREEN TYPE PVC	INSTALLATION METHOD POURED
JOINT TYPE FLUSH THREADED	SLOT SIZE 0.020"	FILTER PACK QTY 350 lbs
GROUT QUANTITY 12 SACKS	CENTRALIZERS STEEL SPRING	FILTER PACK TYPE QUIKRETE ALL PURPOSE SAND
GROUT TYPE 75 GAL. H2O : 1 SACK CEMENT 2 lbs QUIK GEL	DRILLING MUD TYPE 50 lbs QUIK GEL ~ 150 GAL. H2O	INSTALLATION METHOD POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.3	GROUND SURFACE
0.0	REFER TO WELL BP3 FOR STRATIGRAPHY FROM 0.0 TO 49.0 FT.
83.8	BEGIN SAMPLING AT 53.5'
53.5	STIFF BLACK SILTY CLAY (CH)
80.3	
57.0	STIFF GRAY SILTY CLAY, SOME FINE SAND (CL)
67.3	
70.0	GRAY FINE TO MEDIUM SAND, SOME SILT TO SOME CLAYEY SILT (SM)
44.3	
93.0	HARD GRAY SILTY CLAY, TRACE FINE SAND (CH)
42.3	
95.0	BOTTOM OF HOLE AT 95.0.

WELL SKETCH



INSTALLATION NOTES

DRILLED 9" HOLE TO 51'. SET AND GROUTED 6" SURFACE CASING USING 6 SACKS OF CEMENT. DRILLED 5" HOLE TO 95'. INSTALLED 2" SCREEN AND CASING. PLACED SAND PACK UP TO 59.0 FT. JETTED SCREEN AND PUMPED AT 2.5 gpm FOR APPROX. 1 HOUR. PLACED BENTONITE SEAL UP TO 50.5'. ALLOWED TO HYDRATE OVERNIGHT, THEN JETTED AND PUMPED AS BEFORE. PLACED SAND PAD TO 48.5' AND GROUTED TO SURFACE USING 6 SACKS OF CEMENT.

WELL DEVELOPMENT NOTES

PUMPED 2 HRS. AT 6 GAL./MIN. WITH JET PUMP AFTER COMPLETION.

3 10 00224

MONITORING WELL INSTALLATION LOG

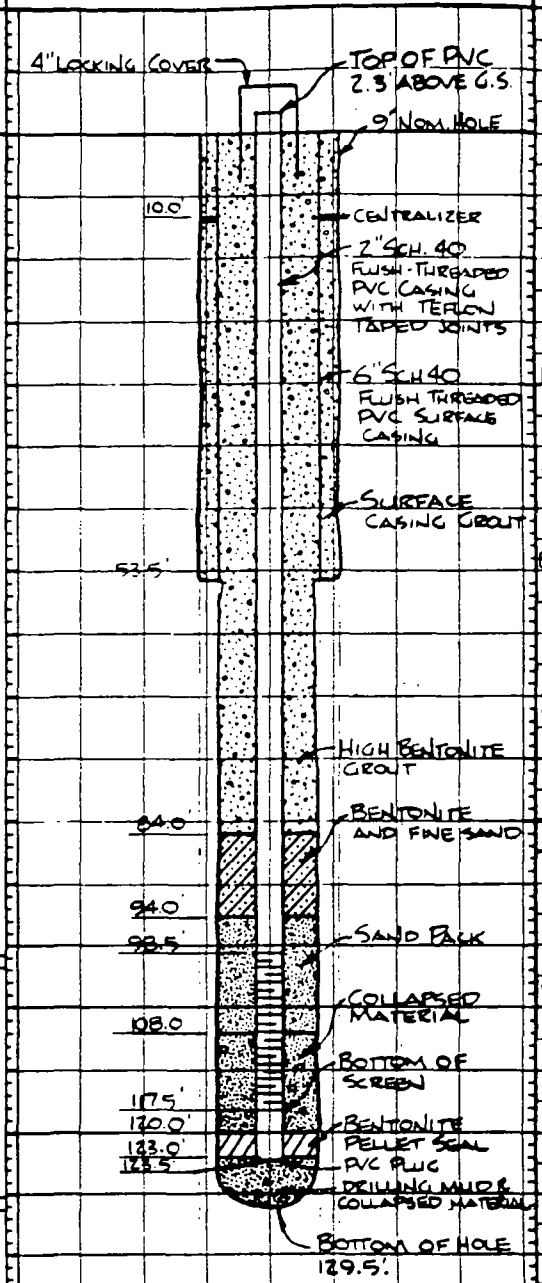
JOB NO 843-3070 PROJECT SCONEC / BLUFF ROAD / SS WELL NO DW3 SHEET 1 of 1
GA INSP AES DRILLING METHOD MUD ROTARY GROUND ELEV 137.4 WATER DEPTH 15.4
WEATHER CLDY DRILLING COMPANY GEO CONSTRUCTION TESTING COLLAR ELEV 139.7 DATE/TIME 4/26/85
TEMP. 70° DRILL RIG CME 55 DRILLER D. JONES STARTED 10:30 (TIME) 3/1/85 (DATE) COMPLETED 5:00 (TIME) 3/1/85 (DATE)

MATERIALS INVENTORY

WELL CASING 2" in. dia. 96.3 l.f. | WELL SCREEN 2" in. dia. 20 l.f. | BENTONITE SEAL 50#
CASING TYPE PVC | SCREEN TYPE PVC | INSTALLATION METHOD POURED
JOINT TYPE FLUSH THREADED | SLOT SIZE 0.020" | FILTER PACK QTY 280#
GROUT QUANTITY 10.5 SACKS | CENTRALIZERS - | FILTER PACK TYPE QUIKRETE ALL PURPOSE SAND
GROUT TYPE SEE NOTES | DRILLING MUD TYPE 50# QUICK GEL ~150 GAL H2O | INSTALLATION METHOD POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
137.4 / 0.0	GROUND SURFACE
	REFER TO WELL BP3 AND DW-2 FOR STRATIGRAPHY FROM 0 TO 95'.
58.5 / 79.0	GRAY SILTY, TRACE FINE SAND, CL
	BROWN FINE TO MEDIUM SAND TRACE SILT. SP
9.4 / 128.1	HARD WHITE SILTY CLAY, TRACE FINE SAND CL
129.5	BOTTOM OF HOLE 129.5'

WELL SKETCH



INSTALLATION NOTES

DRILLED 9" HOLE TO 53', SET 6" SURFACE CASING AND GROUT USING 3.5 SACKS OF CEMENT DRILLED 5" HOLE TO 129.5 FT. INSTALLED PVC SCREEN AND CASING. PLACED LOWER BENTONITE SEAL. FORMATION COLLAPSED BELOW 118.0 FT. INSTALLED SAND PACK TO 94.0 FT. JETTED WELL PRIOR TO PLACING THE UPPER BENTONITE SEAL (84 TO 94) THE CLAY AT THE CASING SEAT SQUEEZED IN CAUSING SOME OF THE BENTONITE TO BRIDGE IN THE SURFACE CASING. THIS BENTONITE WAS ROTTED DOWN INTO PLACE AT THE SAME TIME. FINES REMOVED FROM THE SAND PACK DURING JETTING WERE ALSO SETTLING. BECAUSE THE THICKNESS AND INTEGRITY OF THE BENTONITE SEAL WAS SUSPECT, THE WELL WAS GROUTED WITH LOW PERMEABILITY, LOW FLUID LOSS GROUT: 94# CEMENT: 5# QUICK GEL: 15 GAL H_2O. PLACED STEEL COVER.

WELL DEVELOPMENT NOTES

PUMPED 5 HOURS AT 15 gpm. BEFORE PUMPING PH = 11.8. AFTER PUMPING PH = 6.8. AIR LIFTED WITH 1" EDUCTOR PIPE AT BOTTOM OF CASING TO REMOVE SILT.

2 10 00225

MONITORING WELL INSTALLATION LOG

JOB NO 853-3079 PROJECT SCDHEC / BLUFF RD / SC WELL NO C-1 SHEET 1 OF 1

GA INSP N.G.G. DRILLING METHOD ROTARY GROUND ELEV 138.6 WATER DEPTH —

WEATHER LIGHT RAIN AND SUNNY DRILLING COMPANY AC BORINGS INC. COLLAR ELEV 140.83 DATE/TIME —

TEMP 30° TO 55° F DRILL RIG DAVEY DRILLER CHARLIE BURKE STARTED 10:30 / 12-16-85 (TIME / DATE) COMPLETED 2:00 / 12-17-85 (TIME / DATE)

MATERIALS INVENTORY

WELL CASING 6.0 ID. in. dia. 17.2 lf

CASING TYPE GALVANIZED STEEL

JOINT TYPE THREADED

GROUT QUANTITY —

GROUT TYPE —

WELL SCREEN 6.0 in. dia. 35.3 lf

SCREEN TYPE GALVANIZED STEEL

SLOT SIZE 20.1' OF #30 SLOT, 15.2' OF #20 SLOT

CENTRALIZERS NONE

DRILLING MUD TYPE JOHNSON REVERT

BENTONITE SEAL PELLETS 4.0'

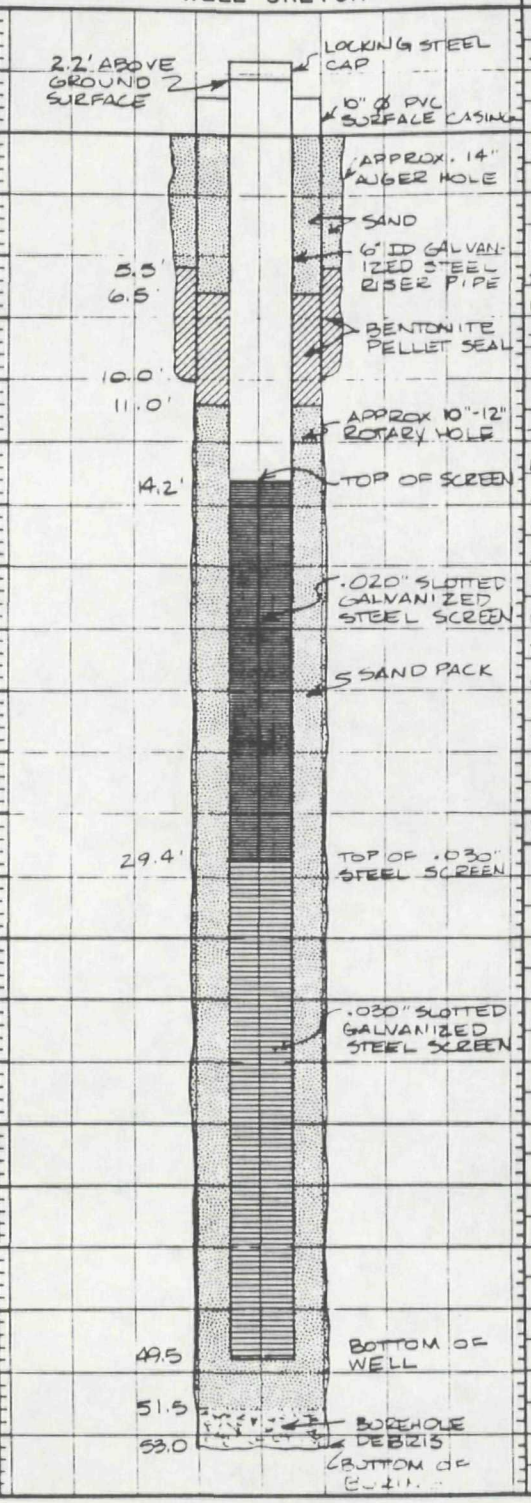
INSTALLATION METHOD GRAVITY - HAND POURED

FILTER PACK QTY ≈ 200 GALS.

FILTER PACK TYPE BUCKSHOT SILICA SAND

INSTALLATION METHOD GRAVITY FALL - HAND POURED WHILE FLUSHING

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.0	REDDISH BROWN, CLAYEY SILT SOME FINE SAND (ML)
6.0	WHITE SLIGHTLY MICACEOUS FINE SAND, SOME SILT (SM)
8.0	WHITE, FINE TO COARSE SAND, TRACE SILT (SP)
49.5	BLACK TO GRAY CLAY (CL)
53.0	BOTTOM OF HOLE AT 53.0 FT



INSTALLATION NOTES

AUGERED ≈14" DIAM. (Ø) HOLE TO 10.0'. INSERTED 10" Ø SURFACE CASING (CSG) AND ATTEMPTED TO PUSH. PUSHED CSG TO 11.0' BELOW GROUND SURFACE (BGS). ADDED 10 GALS. OF PELLETS BENTONITE SEAL IN ANNULAR SPACE FROM ≈10.0' TO 5.5' BGS. ROTARY DRILLED A 10" TO 12" Ø HOLE TO 53.0' USED MUNICIPAL WATER SOUNDED HOLE @ 46.5' BGS WHILE FLUSHING. TRIED NUMEROUS TIMES TO FLUSH HOLE TO 49.5'; UNSUCCESSFUL. MIXED JOHNSON REVERT AND REMOVED DEBRIS IN HOLE. CLEANED HOLE TO 51.5' INSTALLED 6" Ø GALVANIZED STEEL SCREEN AND RISER CSG. COULD NOT USE CENTRALIZERS DUE TO CRIMP IN 10" Ø SURFACE CSG. ADDED SAND PACK WHILE FLUSHING WITH CLEAR MUNICIPAL WATER ADDED APPROX 180 GALS. OF SAND. INSTALLED BENTONITE SEAL AROUND RISER. BACKFILLED TO TOP OF CSG WITH SAND, USED CONTRACTOR'S PUMP.

WELL DEVELOPMENT NOTES

PUMPED WELL @ ≈40 GPM FOR 1HR. TO REMOVE SEDIMENT IN WELL. USED 1" PVC WITH FOOT VALVE ON BOTTOM. REMOVED ≈ 2,400 GALS. JETTED WELL @ ≈60-70 psi WITH APPROX. 6,500 GALS OF MUNICIPAL WATER. INSTALLED SUBMERSIBLE PUMP WITH INTAKE @ ≈47.2' BGS. PUMPED 12,222 GALS FROM WELL DURING TESTING OF PUMP AND STOP TEST ALL WATER REMOVED PUMPED INTO SURFACE LAGOON ON-SITE.

3 10 00226

MONITORING WELL INSTALLATION LOG

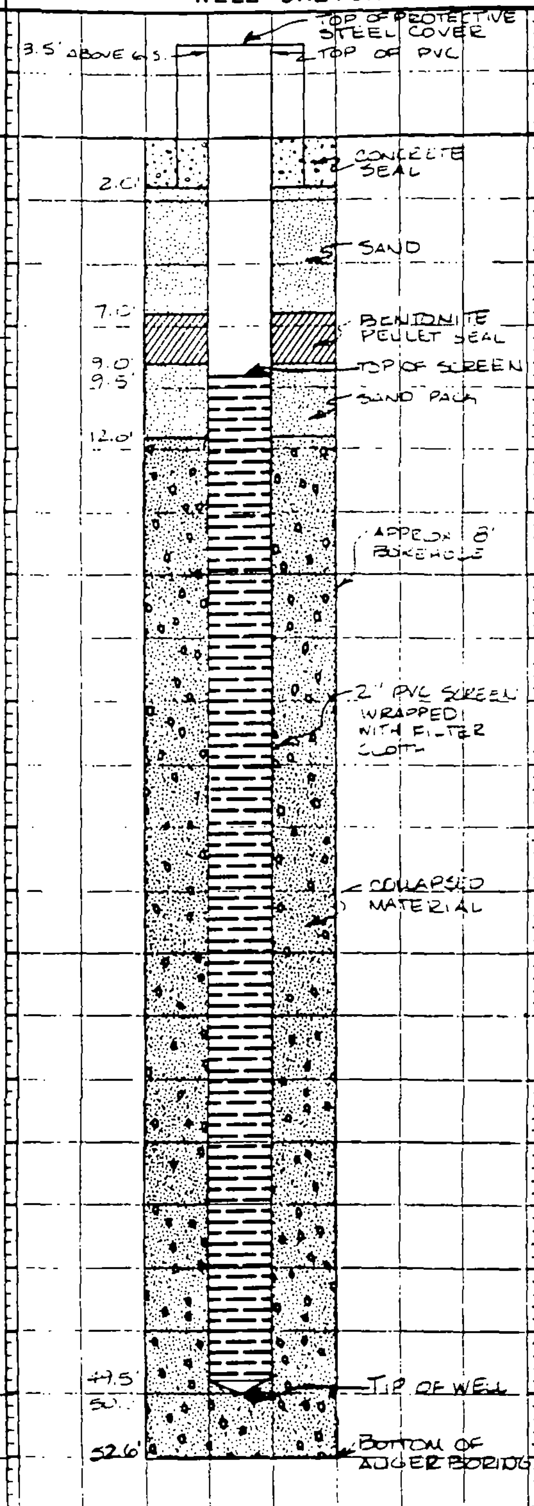
JOB NO [illegible]	PROJECT [illegible]	WELL NO O-2	SHEET 1 OF 1
GA INSP AES	DRILLING METHOD HOLLOW STEM AUGER	GROUND ELEV 138.7	WATER DEPTH —
WEATHER [illegible]	DRILLING COMPANY TRI-STATE	COLLAR ELEV 142.24	DATE/TIME —
TEMP [illegible]	DRILL RIG CME 550 DRILLER RICK	STARTED 10:00 / 12-3-85 (TIME / DATE)	COMPLETED 12:30 / 12-3-85 (TIME / DATE)

3 10 00227

MATERIALS INVENTORY

WELL CASING 2" in. dia. 13.0 l.f.	WELL SCREEN 2" in. dia. 40 l.f.	BENTONITE SEAL 100±
CASING TYPE SCH 40 PVC	SCREEN TYPE MILLED SLOT PVC	INSTALLATION METHOD HAND POURED
JOINT TYPE FLUSH THREADED TEFLON WRAP	SLOT SIZE 0.020"	FILTER PACK QTY 500±
GROUT QUANTITY —	CENTRALIZERS —	FILTER PACK TYPE CHEROKEE F-13 SAND
GROUT TYPE —	DRILLING MUD TYPE —	INSTALLATION METHOD HAND POURED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
138.7 / 0.0	GROUND SURFACE		ALL PVC AND FILTER FABRIC WAS STEAM CLEANED PRIOR TO USE.
	ORANGE BROWN SILTY CLAY AND FINE SAND (CL)		INSTALLED: 40.0' SCREEN, 13.0' CASING, 0.5' WELL POINT. AFTER PULLING THE AUGERS, THE HOLE COLLAPSED TO 12.0'.
130.7 / 8.0	YELLOW BROWN FINE TO MEDIUM SAND, LITTLE CLAY, SILT (SP-SM)		PLACED SAND PACK TO 9.0'. PLACED BENTONITE SEAL TO 7.0'. PLACED SAND TO 2.0'. SET PROTECTIVE STEEL COVER IN CONCRETE SEAL.
123.7 / 15.0	YELLOW-GRAY FINE TO COARSE SAND, LITTLE SILT (SP-SM)		NOTE: ALL DOWNHOLE MEASUREMENTS MADE WITH A WEIGHTED TAPE
88.6			**WELL DEVELOPMENT NOTES**
50.1	STIFF DARK GRAY SILTY CLAY (CL)		WELL NOT DEVELOPED.
86.1 / 52.6	BOTTOM OF HOLE AT 52.6 FT		



APPENDIX C

Results of Chemical Analysis of On-Site Soil Samples

3 10 00229

Client: Golder Associates

ABI Number: 202-265

Project: Sudhel/Bluff Rd. S.C.

Client Number:
853-3079
P.O. 85-0118

(Invoice to)

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

****
* For In-House Use *
*
*
*
****

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: Golder (A.E. Stone, Jr.)

Other: _____

ABI Manager: F. Gheesling

Sampled: 1/23/85 Received: 1/30/85 Required: 3/5/85 Completed: 2/26/85

Sample number	Station	Test required	Results (ppb)
T1866	Composite 2	GC/MS FRACTION-ACID COMPOUNDS	
		2-Chlorophenol	<10
		2,4-Dichlorophenol	<10
		2,4-Dimethylphenol	<10
		4,6-Dinitro-O-cresol	<5
		2,4-Dinitrophenol	<50
		2-Nitrophenol	<20
		4-Nitrophenol	<50
		P-chloro-M-cresol	<10
		Pentachlorophenol	<10
		Phenol	<10
		2,4,6-Trichlorophenol	<10

Client: Golder Associates

ABI Number: 202-265

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079
P.O. 85-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_ soil ___tissue

Sampled by: Golder (A.E. Stone, Jr.)

Other: _____

ABI Manager: F. Gheesling

Sampled: 1/23/85 Received: 1/30/85 Required: 3/5/85 Completed: 2/26/85

Sample number	Station	Test required	Results (ppb)
T1867	Composite 3	GC/MS FRACTION-BASE/NEUTRAL COMPOUNDS	
		Acenaphthene	<10
		Acenaphthylene	<10
		Anthracene	<10
		Benzidine	<40
		Benzo (a) anthracene	<10
		Benzo (a) pyrene	<20
		3,4-Benzo-fluoranthene	<20
		Benzo (ghi) perylene	<20
		Benzo (k) fluoranthene	<20
		Bis (2-chloroethoxy) methane	<20
		Bis (2-Chloroethyl) ether	<20
		Bis (2-Chloroisopropyl) ether	<20
		Bis (2-Ethyl-hexyl) phthalate	<10
		4-Bromophenyl phenyl ether	<10
		Butyl benzyl phthalate	<10
		2-Chloronaphthalene	<10
		4-Chlorophenyl phenyl ether	<10
		Chrysene	<20
		Dibenzo (a,h) anthracene	<20
		1,2-Dichlorobenzene	<10
		1,3-Dichlorobenzene	<10
		1,4-Dichlorobenzene	<10
		3,3'-Dichlorobenzidine	<20
		Diethyl phthalate	<10
		Dimethyl phthalate	<10
		Di-N-Butyl phthalate	<10
		2,4-Dinitrotoluene	<20
		2,6-Dinitrotoluene	<20
		Di-N-Octyl phthalate	<10
		1,2-Diphenylhydrazine	<20
		Fluoranthene	<10
		Fluorene	<10
		Hexachlorobenzene	<10
		Hexachlorobutadiene	<5
		Hexachlorocyclopentadiene	<5
		Hexachloroethane	<10
		Indeno (1,2,3-cd) pyrene	<10
		Isophorone	<10
		Naphthalene	<10
		Nitrobenzene	<10
		N-Nitrosodi-methylamine	<10
		N-Nitrosodi-N-Propylamine	<10
		N-Nitro-sodiphenylamine	<10
		Phenanthrene	<10
		Pyrene	<10
		1,2,4-Trichlorobenzene	<10

3 10 00231

Client: Golder Associates

Project: Sudhel/Bluff Rd. S.C.

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Attention: Mr. A.E. Stone, Jr.

(Invoice to)
Same

ABI Number: 202-265

Client Number:
853-3079
P.O. 85-0118

For In-House Use

Sample: ___water _x_soil ___tissue

Other: _____

Sampled by: Golder (A.E. Stone, Jr.)

ABI Manager: F. Gheesling

Sampled: 1/23/85 Received: 1/30/85 Required: 3/5/85 Completed: 2/26/85

Sample number	Station	Test required	Results (ppb)
T1868	Composite 4	GC/MS FRACTION- PESTICIDES	
		Aldrin	<0.005
		BHC-alpha	<0.005
		BHC-beta	<0.005
		BHC-delta	<0.005
		BHC-gamma	<0.005
		Chlordane	<0.050
		4,4'-DDT	<0.010
		4,4'-DDE	<0.005
		4,4'-DDD	<0.010
		Dieldrin	<0.005
		Endosulfan-alpha	<0.005
		Endosulfan-beta	<0.005
		Endosulfan sulfate	<0.010
		Endrin	<0.005
		Endrin aldehyde	<0.010
		Heptachlor	<0.005
		Heptachlor epoxide	<0.005
		PCB-1242	<0.050
		PCB-1254	<0.100
		PCB-1221	<0.100
		PCB-1232	<0.100
		PCB-1248	<0.100
		PCB-1260	<0.200
		PCB-1016	<0.050
		Toxaphene	<0.050

3 10 00232

Client: Golder Associates

Project: Sudhel/Bluff Rd. S.C.

(Invoice to) Same

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Attention: Mr. A.E. Stone, Jr.

ABI Number: 202-265

Client Number:
853-3079
P.O. 85-0118

****
* For In-House Use *
*
*
*
****

Sample: ___water _x_soil ___tissue

Other: _____

Sampled by: Golder (A.E. Stone, Jr.)

ABI Manager: F. Gheesling

Sampled: 1/23/85 Received: 1/30/85 Required: 3/5/85 Completed: 2/26/85

Sample number	Station	Test required	Results (ppm)
T1869	Composite 5	METALS	
		Antimony	<0.02
		Arsenic	0.06
		Beryllium	<0.002
		Cadmium	<0.001
		Chromium	7.0
		Copper	6.4
		Lead	<0.01
		Mercury	<0.002
		Nickel	<0.04
		Selenium	0.13
		Silver	<0.1
		Thallium	<0.01
		Zinc	0.542
T1870	Composite 6	Cyanide	<0.1
T1871	Composite 7	Phenols	14.1

3 10 00233

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

Client Number:
853-3079.5.4
P.O. 85-0103-0118

(Invoice to)

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/23/85

Sample Received: 1/30/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
			GC/MS VOLATILES		
T1849		4-3	Benzene	7	4
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	<5	<5
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	19
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	<5	<5
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	7	23
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	<5	<5
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

Boring ST-4
Sample 3

3 10 00234

Page 3 of 19

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079.5.4
P.O. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

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* For In-House Use *
*
*
*
****

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1850		7-3	GC/MS VOLATILES		
			Benzene	<5	<5
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	256	5
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	73	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	<5	<5
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	<5	7
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	658	5
			1,1,2-Trichloroethane	39	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	94	34
			Vinyl chloride	<10	<10

Boring ST-7
Sample 3

3 10 00235

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

Client Number:
853-3079.5.4
P.O. 85-0103-0118

(Invoice to)

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1851		7-7	GC/MS VOLATILES		
			Benzene	14	<5
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	<5	<5
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	<5	9
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	11	4
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	22	7
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

Boring ST-7
Sample 7

3 10 00236

Page 5 of 19

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

(Invoice to)

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

****
* For In-House Use *
*
*
*
****

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1852		8-5	GC/MS VOLATILES		
			Benzene	<5	<5
			Bromoform	<10	<10
		Boring ST-8 Sample 5	Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	376	22
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	<5	<5
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	131	4
			Toluene	9	18
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	56	11
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

3 10 00237

Client: Golder Associates

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

ABI Number: 202-327

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

****
* For In-House Use *
*
*
*
****

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1853		9-1	GC/MS VOLATILES		
			Benzene	29	12
			Bromoform	<10	<10
		Core ST-9 Sample 1	Carbon tetrachloride	<5	<5
			Chlorobenzene	132	16
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	51	<5
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	489	91
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	<5	<5
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	23465	1361
			Toluene	345	65
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	1688	87
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	86	<5
			Vinyl chloride	<10	<10

3 10 00238

Page 7 of 19

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

(Invoice to)

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

****
* For In-House Use *
* *
* *
* *
****

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_ soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1854		9-3	GC/MS VOLATILES		
			Benzene	56	9
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	<5	<5
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	11
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	94	<5
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	37	25
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	<5	<5
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

Boring ST-9
Sample 3

3 10 00239

ABI Number: 202-327

Client: Golder Associates

Project: Sudhel/Bluff Rd. S.C.

(Invoice to) Same

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sampled by: A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

ABI Manager: F. Gheesling

Other: _____

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1855		10-1	GC/MS VOLATILES		
			Benzene	21	<5
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	13	2
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	379	48
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	24	19
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	200	<5
			Toluene	1080	29
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	8	7
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

3 10 00240

Page 9 of 19

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

****
* For In-House Use *
* *
* *
* *
****

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1856		11-3	GC/MS VOLATILES		
			Benzene	<5	<5
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	<5	<5
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	<5	<5
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	11	25
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	<5	<5
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

3 10 00241

Page 10 of 19

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

Client Number: 853-3079.5.4
P.O. No. 85-0103-0118

(Invoice to)

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1857		12-1	GC/MS VOLATILES		
			Benzene	82	2
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	168	32
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	<5	<5
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	110	5
			1,1,2,2-Tetrachloroethane	<10	15
			Tetrachloroethylene	231	<5
			Toluene	106	8
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	30	5
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	115	6
			Vinyl chloride	<10	<10

Boring ST-12
Sample 1

3 10 00242

Page 11 of 19

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1858		12-4	GC/MS VOLATILES		
			Benzene	21	9
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	44	32
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	<5	<5
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	114	29
			Toluene	12	16
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	<5	<5
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	21	7
			Vinyl chloride	<10	<10

Borehole ST-12
Sample 4

3 10 00243

Page 12 of 19

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1859		12-A	GC/MS VOLATILES		
			Benzene	352	101
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	8	4
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	24	7
			1,1,2,2-Tetrachloroethane	<10	1
			Tetrachloroethylene	<5	<5
			Toluene	8	5
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	38	7
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

3 10 00244

Page 13 of 19

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_ soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1860		14-1	GC/MS VOLATILES		
			Benzene	12	<5
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	<5	<5
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	41	9
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	14	6
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	14	19
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

3 10 00245

Page 14 of 19

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1861		17-1	GC/MS VOLATILES		
			Benzene	2035	8250
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	39	43
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	<5	<5
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	1250	4292
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	125	648
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	<5	<5
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

3 10 00246

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_ soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1862		17-2	GC/MS VOLATILES		
			Benzene	<5	<5
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	47	10
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	<5	<5
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	<5	<5
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	<5	<5
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

Ecorse ST-17
Sample 2

3 10 00247

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1863		17-3	GC/MS VOLATILES		
			Benzene	3	153
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	3	8
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	11	177
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	2	353
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	6	<5
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

3 10 00248

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

(Invoice to)

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

****
* For In-House Use *
*
*
*
****

Attention: Mr. A.E. Stone, Jr.

Sample: __water _x_ soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1864		19-2	GC/MS VOLATILES		
			Benzene	4	313
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	1	11
			Cis-1,3-dichloropropene	13	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	16	400
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	3	521
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	7	7
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

Re... ST-19
Sample 2

3 10 00249

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Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

Client Number: 853-3079.5.4
P.O. No. 85-0103-0118

(Invoice to)

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

* For In-House Use *

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

Report Required: 4/30/85

Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1878		2-2	GC/MS VOLATILES		
			Benzene	2	222
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	3	9
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	8	280
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	<5	498
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	6	4
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

ST-2
Sample 2

3 10 00250

Client: Golder Associates

ABI Number: 202-327

Project: Sudhel/Bluff Rd. S.C.

Client Number:
853-3079.5.4
P.O. No. 85-0103-0118

(Invoice to)

Address: 3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340

Same

****
* For In-House Use *
*
*
*
****

Attention: Mr. A.E. Stone, Jr.

Sample: ___water _x_soil ___tissue

Sampled by: A.E. Stone, Jr.

Other: _____

ABI Manager: F. Gheesling

Sample Taken: 1/11/85

Sample Received: 1/16/85

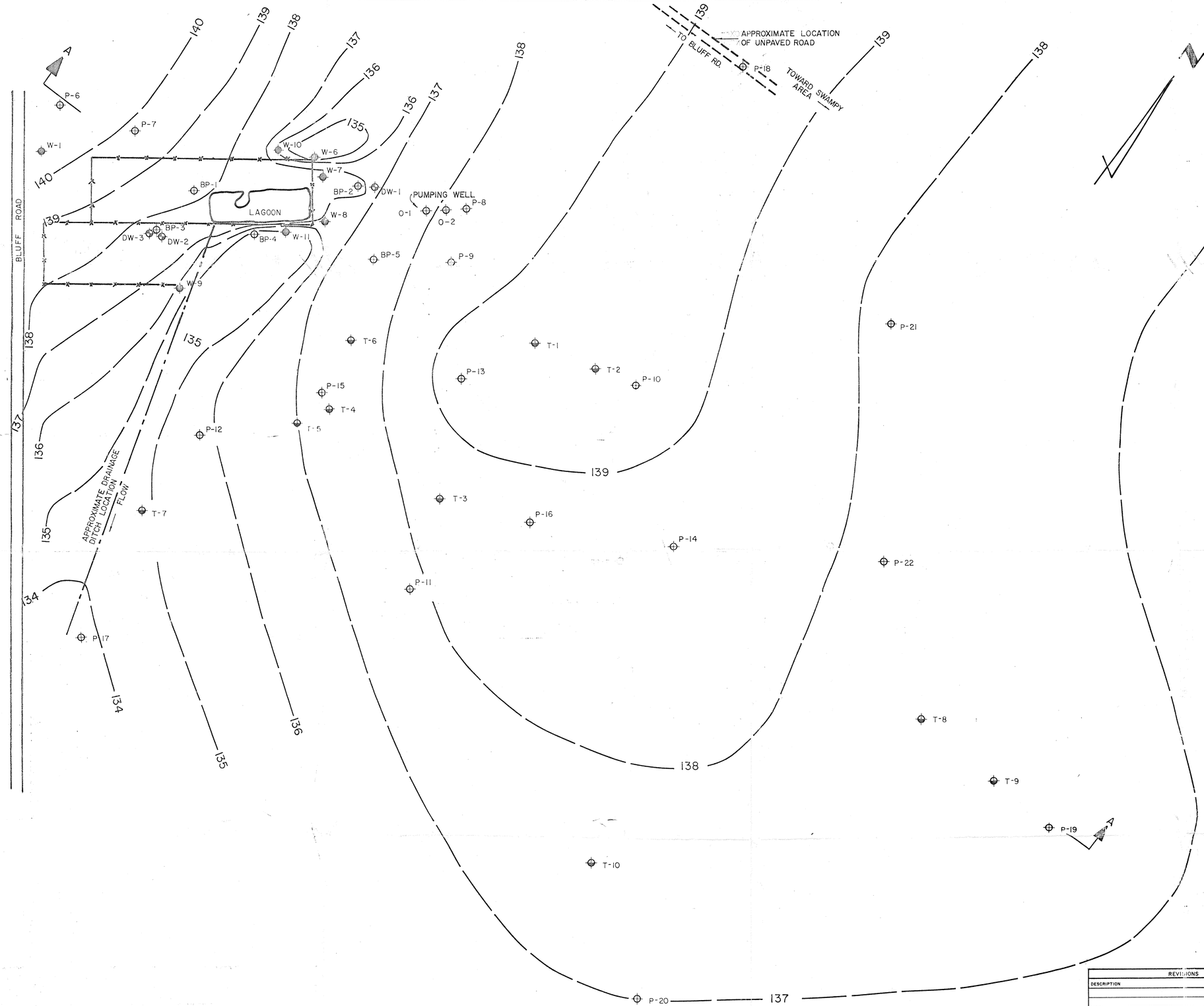
Report Required: 4/30/85

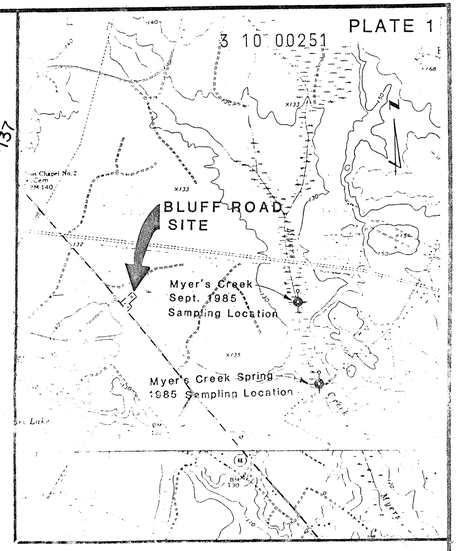
Report Issued: 6/7/85

Sample number	Book/Page Number	Station	Test required	Run 1 Results (ppb)	Run 2 Results (ppb)
T1879		15-2	GC/MS VOLATILES		
			Benzene	39	15
			Bromoform	<10	<10
			Carbon tetrachloride	<5	<5
			Chlorobenzene	<5	<5
			Chlorodi-bromomethane	<5	<5
			Chloroethane	<10	<10
			2-Chloroethylvinyl ether	<10	<10
			Chloroform	5	16
			Cis-1,3-dichloropropene	<10	<10
			Dichlorobromomethane	<5	<5
			1,1-Dichloroethane	<5	<5
			1,2-Dichloroethane	<10	<10
			1,1-Dichloroethylene	<5	<5
			1,2-Dichloropropane	<10	<10
			Ethylbenzene	<5	<5
			Methyl bromide	<10	<10
			Methyl chloride	<10	<10
			Methylene chloride	44	29
			1,1,2,2-Tetrachloroethane	<10	<10
			Tetrachloroethylene	<5	<5
			Toluene	20	28
			1,2-Trans-Dichloroethylene	<5	<5
			1,1,1-Trichloroethane	11	16
			1,1,2-Trichloroethane	<5	<5
			Trans-1,3-dichloropropene	<10	<10
			Trichloroethylene	<5	<5
			Vinyl chloride	<10	<10

Boring ST-15
Sample 2

PLATE 1





SITE LOCATION MAP
N.T.S.

LEGEND

- DEEP WELL
- SCDHEC WELL
- SURFICIAL AQUIFER WELL
- TEST BORING

—137— APPROXIMATE GROUND ELEVATION (FT., MSL); TOPOGRAPHIC CONTOURS ESTIMATED FROM FROM SURVEYED BORING AND WELL INSTALLATION GROUND SURFACE ELEVATIONS

0 100 200 300 400
SCALE IN FEET

REVISIONS		
DESCRIPTION	BY	DATE

SOUTH CAROLINA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL CONTROL
BLUFF ROAD SITE, RICHLAND COUNTY, S.C.

TITLE
BORING AND WELL LOCATION MAP

DRAWN LJW	SCALE AS SHOWN	DATE 1/22/86
CHECKED MTF	REVIEWED MTF	JOB NO. 853-3079
Golder Associates		DWG NO. 14
		PLATE 1